



THE
STUDENT'S
VADE MECUM.





THE

STUDENT'S

VADE MEUM.



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THE STUDENT'S VADE MECUM,

CONTAINING
A N A C C O U N T,

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| 1. OF KNOWLEDGE AND
ITS GENERAL DIVISIONS. | ANALOGY TO REVE-
LATION OR TRUE PHI-
LOSOPHY. |
| 2. OF HISTORY. | |
| 3. OF PHILOSOPHY. | 6. OF THE DIFFERENT
SYSTEMS OF PHILOSO-
PHY, WITH A SHORT
ACCOUNT OF THE
MOST EMINENT PHI-
LOSOPHERS OF DIF-
FERENT AGES. |
| 4. OF THE INSTITUTION
OF SOCIETY AND NA-
TURE OF GOVERN-
MENT. | 7. OF MATHEMATICS. |
| 5. OF THE HEATHEN
IDOLATRY OR FALSE
PHILOSOPHY, AND ITS | |

WITH

DIRECTIONS how to proceed in the Study of
each Branch of Learning, and an Account of the
proper Books to be read upon each Subject.

By WILLIAM SMITH, M.D.

The Whole is calculated for the Use of STUDENTS,
and to supply, as much as may be, the Want of a
Regular UNIVERSITY EDUCATION.

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THE STUDENT'S VADE MECUM.

CONTAINING
AN ACCOUNT

1. OF KNOWLEDGE AND ITS EXTENT TO HAVE
ITS GENERAL DIVISION OF THE
2. OF HISTORY
3. OF PHILOSOPHY
4. OF THE INSTITUTIONS
OF SOCIETY AND NA-
TURE OF GOVERN-
MENT.
OF THE HEAVENLY
SCIENCE OF ASTRONOMY
PHYSICS, AND ITS
BRANCHES.



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T-H-T



THE
STUDENT'S
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CHAP. I.
OF KNOWLEDGE, AND ITS GENERAL
DIVISIONS.

AS KNOWLEDGE is that which eminently distinguishes man from the brute creation; and as the different degrees of it, which individuals possess, make those distinctions which are observable among our own species, we certainly ought to improve and cultivate it as far as lies in our power.

So pleasing is the enquiry after knowledge,
and so satisfactory is the discovery of it upon
B searching.

searching, that the relish and enjoyment of it far exceed the most sensual pleasures; and no person deserves the name of a man, who does not allow his rational faculty full and free exercise in the contemplation of God and his creation.

The erectness of man's stature, if that is natural to him, (which indeed I very much doubt) does not sufficiently distinguish him from brutes; of which those may be accounted only a higher species, who can patiently suffer the imprisonment of their faculties in a dungeon of ignorance and stupidity, and know themselves to have existence, only by those characters by which Alexander knew himself not to be a god; i. e. by their propensity to intemperance, hunger, and sleep.

The soul of man may become brutal, without removing its lodging into the body of an ass; and that man, who follows the guidance of his sensual appetites, and allows his rational and immortal part no share in the direction of his conduct, is worse than a brute, and is unjustly ranked in the highest scale of this sublunary creation: for there is not an animal
sense

sense in which some species of the brute creation does not excell man. Yet man infinitely excells all the other parts of this sublunary creation, in that he is made capable of knowing, serving, and enjoying his great Creator for ever; and in so far as he co-operates with the intention of providence in his creation, so far is he the favourite of heaven, the noblest work of this creation, and the king and potentate of this lower world; and may almost come within sight of the angels in knowledge and sublime contemplation: yet he may become as much a beast, as the horse he rides, or the dog he feeds: so much will the soul of man degenerate from itself, if not improved as it ought to be.

God has made man, those particularly who are instruments in his hands for the discovery of the works of his creation to others, and for their improvement, guidance, and direction, with impatient longings after true knowledge, as the touched needle runs to the closest embraces of the magnet, or as Socrates fancied of friends in the other world.

Knowledge in general may be divided into three kinds, viz. HISTORICAL, PHILOSOPHICAL and MATHEMATICAL.

The object of *historical knowledge* is facts and transactions, whether in the material world, or the mind of man. And as all those things, about which historical knowledge or history is versant, must have their causes, so the knowledge of the causes of things, is what constitutes *philosophical knowledge*, or *philosophy*.

Again, every thing that exists, and comes under the denomination of quantity, has certain precise limits and denominations, the knowledge and determination of which is called *mathematical knowledge*, or *mathematics*.

These three kinds of knowledge may be illustrated in the following manner.

It is an obvious remark, that the course of a river is always to the sea; whoever knows this, is possessed of historical knowledge. This is owing to two causes; first, the declivity
of

of the channel; and secondly, the pressure of the superior upon the inferior water, and the impulsive force of the air or acid spirit which fills the universe, pervades all bodies, and is the cement of all nature. The man who knows these causes, possesses *philosophical* knowledge, or *philosophy*; and if any person should, from precisely knowing the declivity of the channel, the pressure of the superior upon the inferior water, and the force of the *sal-catbolicus*, or air, calculate the velocity of the stream and the quantity of water, carried down in any given time, that man possesses *mathematical* knowledge, or *mathematics*.

This may be illustrated by another example.

We find from the winter to the summer solstice, the heat continually increasing; he that knows this, possesses *historical* knowledge. This is owing to two causes; to the longer continuance of the sun above the horizon, and to his rays striking the earth more strongly in a perpendicular direction to us? He who knows these two causes, possesses *philosophical* knowledge. He again, who from observing and knowing how much longer the sun continues

above the horizon, and how much nearer the rays of the sun are to a perpendicular direction, can calculate the quantity of the increase of heat, in any given time, possesses *mathematical* knowledge.

Having now given a general division of knowledge into three kinds, I proceed to a more particular one, beginning with history.

CHAP. II.

OF HISTORY.

THE first part of knowledge we ought to apply ourselves to, after acquiring a competent knowledge of the languages, is history; because it is necessary for us to know what things do exist, and in what manner they do so, before we can inquire into the cause of them. Historical knowledge then, or history, according to the several sorts of facts and transactions about which it is conversant, acquires different names; viz. *natural and civil history*.

The first is versant about natural bodies, and explains their phenomena, and may be divided into three kingdoms or classes, viz. *Regnum lapideum, regnum vegetabile, and regnum animale*. *The kingdom of unorganized bodies, the vegetable kingdom, and the animal kingdom.*

But it is very difficult to make an exact division of natural bodies; for there are some we are at a loss to know into what class to put

them, such as a certain kind of plant called the sensitive plant.

By the *regnum lapideum*, or the kingdom of unorganized bodies, we are to understand, all such bodies as are found on the surface of the earth, or in the bowels of the same, which do not grow, or propagate their kind, and which have no vessels in them, containing juices. Under this class, are comprehended all the fossil tribe; as the different earths, all the different kinds of stones, semipellucid and pellucid gems, and the precious stones, or real gems; also all the semimetallic bodies, such as quicksilver, &c. and all the metallic bodies, as tin, iron, copper, &c. These are all that can be justly called fossiles, &c.

There are more ranked in this class, such as trees, plants, or herbs, coral, sea shells, teeth and bones of animals, both of land and sea, complete fishes, &c.

The trees that are found, are mostly fir, or oak, and sometimes hazle; they are dug out of mosses, some of them petrified, having so much the nature of stone, that they give fire with steel;

steel; others have imbibed such a quantity of metallic substances, as to possess all the qualities of the piritæ, or other mineral ores. There is a remarkable lake in Ireland, into which, if a piece of wood be cast, and suffered to remain a considerable time, it by degrees acquires a stony hardness, and the longer it lies, the more it petrifies, and the harder it becomes.

The substance, in which the plants and herbs are most commonly found in a fossil state, is a kind of slate, lodged about the strata of coal.

The plant most commonly found, is fern, and what is very surprizing, this fern is of the American growth. This slate is called lapis Hibernicus, Irish slate; because most commonly found in Ireland. There are several stones found, in which the leaves of trees are inclosed; and leaves of oaks, in springs, with a crust of spar. There are sometimes found whole vegetable substances, inclosed in stone.

Coral is a marine vegetable substance; it branches out like a tree, and grows under sea water: there are two kinds of it, the red and white.

white. This substance is found in stones, clays, or strata of earth, having the hardness of a stone.

Some shells are found really in their native state; sometimes we find them in a strata of earth, such as stones, chalk, &c. They are easily distinguished from the bodies with which they are mixed, as being soluble in aqua fortis, and also calcinable. Other sea shells, when they happen to be buried in mineral matter, undergo such a change, by the quantity of mineral or crystal, soaked in their pores, as to give fire with steel; they possess too all the properties of the bodies they are mixed with. The marks of them are found sometimes exactly impressed upon the hardest metals, as if they were wax. On the coast of Yorkshire, is found, in great plenty, a sort of petrified substance, called Whitby stones, with all the curves and direct shape of fish and snakes, and the country people, many of them, believe that all these were once snakes, and that they very much infested the country, and disturbed great numbers of people; but by the prayers of one of their devotees, they were all turned into stones.

Teeth,

Teeth, and harder bones of fishes, particularly of sharks, which have three or four rows of them in one jaw, are found upon our own coasts, though the fish is a stranger here, but is commonly found in the Indies, and in America.

The bones of animals, that are most commonly found in a fossile state, are those of elephants and deers. There are horns dug up in Britain and Ireland of deers of the American kind, which were never seen in Europe.

Complete fishes, with their bones petrified, are frequently found in the heart of stone.

“ Search the earth, says a learned author,
“ and you shall find the mouse deer, natives of
“ America, buried in Ireland; elephants, natives
“ of Asia and Africa, buried in the midst
“ of England; crocodiles, natives of the Nile,
“ in the heart of Germany; shell-fish, never
“ known but in the American seas, together
“ with entire skeletons of whales, in the most
“ inland regions of England; trees of vast di-
“ mensions, with their roots and tops, and some
“ also with leaves and fruit, at the bottoms of
“ mines

“ mines and marles ; and that too in regions
 “ where no tree of that kind was ever known
 “ to grow ; nay, where it is demonstrably im-
 “ possible they could grow.”

These trees, fishes, plants, &c. are called extraneous fossils, because they have, one time or other, been in a vegetable or animal state, but have fallen and petrified in the earth, and are found in that state, where most probably they have remained ever since the flood. For as there is an acid spirit, or salt, the same which moved upon the face of the waters at the creation, being that darkness which lay upon the face of the deep put in motion, it is stiled *spirit*, that is a *moving air, or wind*, as the Hebrew Ruah, in a physical sense, and the Latin *spiritus*, from *spiro*, signifies. God calls it *his spirit*, not meaning thereby, as some have erroneously supposed, the Holy Spirit of God, the second person of the ever-blessed Trinity, but asserting or claiming it as the work of his own hands, against those who had made it independant of a creator, and set up the air as their *Jupiter*, or supreme God.* As there is, I say, an acid

* Who ever wishes to know more of the nature and properties of the air, may consult the author's *New and General Sys-*

acid spirit, which we may call *sal catholicus*, seeing it is universally diffused over all the creation, which cements and unites the particles of matter, the original atoms or chaos of the first creation, and forms this beautiful universe, the parts of which are of different figures, solidity, magnitude, and consistence, arising from the different figures and size of the original atoms, or first created matter : So when God almighty, was about to bring a flood upon the earth, he inverted the nature of this acid spirit, and the original atoms, or solid parts of matter, were immediately disengaged from one another, and the world became a pool of water, that is, returned to its original chaos, the ark and its inhabitants, by the Almighty's appointment, being excepted. When all nature was nearly reduced to its original state, then the great creator sent out his almighty *fiat* to this universal spirit, which immediately reassumed its pristine quality, and accordingly the waters began to subside, and dry land appeared ; that is, matter was compacted into a more solid form, and God made a wind to pass over the earth, and the *waters of Physic*, where he'll find the nature and properties of the air fully illustrated, and the use and absolute necessity of it, for both animal and vegetable life, clearly proved.

ters assuaged. Gen. 8. Here the same agent, the spirit, or wind, is employed, as at the first formation, which brought all things to order again, as it did then.

But the extraneous fossils, as teeth, vertebræ, bones of animals, frogs, fishes, serpents, plants, &c. which are found upon the surface, or in the bowels of the earth, were not reduced to their original atoms in the general dissolution at the great deluge, but preserved their proper figure; and were inclosed in the matter or atoms amongst which they were swimming, when the Almighty's *fiat* again went forth, and the acid spirit, reassuming its original quality, began to act.

'Tis very observable, that the extraneous fossil plants, found in this country, are most of them of foreign growth; elephants teeth, huge serpents, &c. of a size never known in this country, have been found here, which no doubt proves the great disturbance of the waters at that time, and the dashing of the atoms against one another. Lord Bacon, Dr. Hill, and others, have written upon fossiles; and who ever wishes to read a very useful and small treatise

treatise upon fossiles, may consult Harris's Lexicon, under the word *Fossile*.

There are some bodies which we have not mentioned, that though not fossile, are unorganized, and are therefore ranked under this class, viz. fire, air, water, and earth; these were called by the antient philosophers, elementary bodies, though there is not so much reason for calling them elements, as the antients imagined.

Having now briefly ended the first general division of natural history; viz. *Regnum Lapidum*, or the *kingdom of unorganized bodies*, I come to the *regnum vegetabile*, or the *vegetable kingdom*, which was the second division.

By the vegetable kingdom, we understand those bodies, which propagate their kind, having vessels of juices and air, passing through them, and even a kind of life, so that they are organized as well as animals, and live a vegetable life. Under this division is comprehended the anatomy of all vegetables, as trees, plants, herbs, and fruit, and the culture and propagation of them; this branch of natural history, is called *botany*.

Botany

Botany is a subject that seems to have been very little known in antient times. Malpighius and Dr. Grew were the first that ever gave any account of it. They observed various kinds of vessels, differently situated, and containing different fluids, they also observed air vessels which contained no fluid but air.

By a system of botany is meant a distribution of plants into classes and orders. Tournefort in his description and system of vegetables, distinguishes them into three classes, viz. *trees*, *shrubs*, and *under shrubs*. These again he subdivides into a great many various genera, no less than twenty-two: but this system, though it justly obtained the preference for a considerable time, has now yielded to a better work of Linnæus. The division of his system is chiefly founded upon the parts of generation, viz. the *stamina* and *pistillariæ*, and includes twenty-four classes, each of which has a distinct name according to the number of stamina and antheræ.

The culture and propagation of vegetables, which is another part of this division of natural history, is properly *agriculture*.

All

All sorts of soils are not capable of producing all sorts of seeds; some are sandy and so light, that all the juices that are lodged in them immediately evaporate by the air, and leave no nourishment for the seeds to subsist upon: on the contrary, there are other soils so unpliant and clayey, that scarce any seed can penetrate thro' them; and there are others that preserve a medium between the two extremes, and are qualified for different productions, according as they correspond to the nature of sand or clay. Therefore to make the most advantage of this variety of soils, it is necessary to know their nature and properties, and the proper seeds and plants for each soil. For this variety of soils has its peculiar advantage, and is manifestly adapted to the variety of seeds; some of which require a light, others a gross earth, and others again thrive in an intermediate soil. But the best soils not only require the assistance of heaven, but of the husbandman, to render them fruitful, and to keep them in good heart and condition. And as strong soils are naturally unpliant and compact, and having but few interstices between the several parts whereof they are composed, and their surface being often hardened like an incrustation, so their earth

C

continues

continues cold, untractable, and unactive; and it is only by dint of labour, by digging deep, and reducing the earth to a fine powder, that they are rendered capable of receiving the warm influences of the sun and impression of the atmosphere. Therefore to bring about this, there must be proper instruments contrived to accomplish this artificial cultivation.

Agriculture, or husbandry, then consists in a perfect knowledge of the above mentioned particulars; and he who wishes to become a good farmer or husbandman must put his hand to all things; he must qualify himself to give directions to others by being able to do it himself; when he has once got the practical part, it will then be proper to read one or more treatises upon the subject, of which we have great numbers.

The books proper to be read in the study of botany and agriculture, are Dr. Linnæus's system of botany; Lee's introduction to botany, extracted from the works of Dr. Linnæus; Dr. Hill's vegetable system; Bradley on the growth of plants; Linnæi genera plantarum; Grew's anatomy of vegetables; Celsus de plantis; Theophrasti hist. plantarum; Bauchini hist. plantarum;

rum; Theophrasti erisii hift. plantarum; Salmon's herbal; Parkinson's herbal; Gerrard's herbal improved by Johnson; Lewis's experim. hift. of the materia medica; Culpepper's English physician; Dr. Hill's British herbal; Exotic botany; Laurence Du Hamel's dictionary of husbandry, &c. Millar's gardener's dictionary.

Natural history, in all its branches, is as entertaining a study as any person can apply to, and next to theology and physic, which, considered as a science abstractedly by itself, is a very contemptible study, and is in fact, in the hands of most people; next to these two, I say, natural history is perhaps the most useful study of all others.

In the prosecution of this study we may read as many of the following books as our time will allow; Dr. Hill's natural history of fossils, plants, and animals; Pitfield's history of animals; Edward's history of birds and gleanings; Albin's history of birds; Albin's history of insects; Swammerdam's history of insects; Swedenborgii principia rerum naturalium & regnum subterraneum; Jonstoni principia piscium,

insectorum, quadrupidum, avium, arborum, &c. Willughbei historia piscium; Brissanii regnum animale in classes novem digestum; Petti-ver's system of natural history; Butler's feminine monarchy, or a treatise on bees; Gesneri animalium, piscium, &c. hist. Aristotelis historia animal. gr. lat. cum Scaligeri com. Nature displayed; Derham's physico-theology; Ray on the creation; Tournefort's voyage to the Levant; Woodward's natural history of fossils; Caesii mineralogia, five natur. philos. thesauri; Agricola de re metallica; Dillenius's history of mosses and corals; Beauties of nature and art displayed, in a tour through the world; Pettus of metals and metallic dictionary; Albin's spiders and other insects; Dictionnaire universel de fossils, par Bertraud; Linnæi species animalium; Dr. Owen's natural history of serpents; Parsons's analogy of the propagation of animals and vegetables.

Chemistry, or the investigation of the nature and component parts of bodies, very properly takes its place here. This is a very useful study, and so entertaining, that some have become mere enthusiasts and chymical madmen, and have spent their time and fortune in searching

ing after the philosopher's stone, and such wild fancies, which never existed but in their distempered imaginations; these people are known and distinguished from the rational chemist, by the name of alchymists, or chemical madmen.

There are many books wrote upon this subject, such as Boerhaave's method of chemistry; Newman's chemistry, translated, abridged and methodised, by Lewis; Millar's new course of chemistry; Friend's chemical lectures; Chymie de Lehman; Chymie de Machy; Chymie de M. Pott traduite par M. Du Machy; Macquer's elements of the theory and practice of chemistry; Lemery's chemistry.

The last class, or division of natural history, was *Regnum animale, the animal kingdom*, which includes the knowledge of all fowls, fishes, quadrupeds, and the human species.

Anatomy, both simple and comparative, comes under this head.

Anatomy considers the structure of the body, and examines into the functions of its parts.

Though there appears a great deal of skill and wisdom in the structure of vegetables and unorganiz'd bodies; yet animals are a higher and more noble order of beings, and require a great share of wisdom and design in their formation. They have spontaneous motion, and enjoy two lives, an animal and a vegetable; and as man is the most perfect animal, his body has been more accurately attended to and examined, and is made the standard whereby to compare others.

Comparative anatomy gives an account in what the parts of other creatures, as quadrupeds, fowls, fishes, insects, differ from those of the human species. Whoever wishes to study anatomy may read Keil; Douglas on the muscles; Monro on the bones; Winslow, with Morganius's tables, &c.

CIVIL HISTORY, which was the second general division of history, gets its name from the subject it treats of. If it is versant about the transactions of mankind, considered as composed of states and kingdoms, and then it is called *civil history proper*.

When

When it treats of church affairs, it is called *ecclesiastical history*,

Previous to the reading of civil history, it is very necessary to have a tolerable knowledge of geography and chronology ; these are so necessary towards attaining a true knowledge of history, that they are called its two eyes ; geography we shall have occasion to mention when we come to treat of mathematics. Chronology is properly ranked under this head.

CHRONOLOGY is the computation or reckoning of time from certain memorable periods. When any memorable event happened in any country, people dated their affairs and transactions from that period. Without the knowledge of chronology, history, in which, as in a mirror, we have the actions and characters of men and countries, cannot be read either with the advantage or satisfaction it is capable of affording to one who understands chronology ; for it is plain that a person can have no distinct, or perfect notion of many transactions related in history, when he has no distinct notion of time and place, which those transactions necessarily require.

As to chronology, it may be sufficient for common readers to understand the chief periods, called *æras* or *epochas*, from which different nations have begun the reckoning of their time. The most remarkable of which are, the creation of the world; the christian *æra* from our Saviour's time; the *epocha* of the Olympiads, so famous amongst the Greek historians, which has its rise from the Olympic games; the *epocha* of *Urbis conditæ*, denoted by the letters U. C. or building of Rome, made use of by the Romans; the *epocha* of Nabonator used by Ptolomy and the orientals; the *epocha* of the Hegira, or Mahomet's flight, made use of by those who profess the Mahometan religion.

The most general epochas are two: First, That which goes under the name of the Julian period, being an imaginary period, which would have begun 1700 years before the creation of the world; at which time the periods, called the cycle of the sun, the cycle of the moon, and the cycle of indiction, would have begun together. It was the famous Joseph Scaliger's contrivance, and served to reduce and reconcile all the other epochas that are used by historians. The first year of the christian *æra*,
according

according to this account, which reckons the nativity of our Saviour after the time it really happened, is the 4714th year of the Julian period.

Secondly, The other principal epocha is the Gregorian period, or new stile ; so called, because Pope Gregory was the first discoverer of it ; this is the epocha which is now used over almost all the christian world.

The principles of chronology we find in a great many books on this subject : the most learned and celebrated is Scaliger de emendatione temporum ; sir Isaac Newton's most learned and curious piece on this subject, entitled, The chronology of the antient kingdoms, published since his death, in which he has detected several errors in the chronology of the antient Greeks and orientals, from astronomical principles entirely new : to which there is an answer written by one Bedford, author of an ingenious and learned treatise, called the scripture chronology, which tends very much to explain the sacred history of the old testament, and to shew the connection of it with profane history. Mr. Kennedy has lately published a very useful and learned

learned system of chronology, in quarto, which is perhaps the best now extant. But the science itself is grounded upon a good deal of uncertainty and conjecture. Blair's tables of chronology drawn to the year 1768, and Bedford's system of chronology demonstrated by astronomical calculations, with maps and cuts, are very useful.

The study of civil history is both entertaining and useful, yet it is too much neglected in the education of youth, who are not even taught so much as either gives them a taste for it, or a plan to go by: this is a great defect in our education, and is productive of very bad consequences; people are thereby imposed upon by every party writer, and swallow every thing he advances, because their ignorance of history renders them incapable to detect his bold but untrue assertions: and before they come of age they generally enlist themselves under the banner of some party, and will not read this history because it is Jacobite, nor that because it is Oliverian; and if they take up a book, wrote by one, said to be of another party, they read it with such prepossessions and prejudice, that they receive very little instruction from it.

He

He who wishes to study civil history ought first to begin with that of his own country, and after acquiring a tolerable knowledge of it, which he may soon do by reading one or two standard writers, such as Hume or Smollet for England; he should then read the following books pretty near in the order they are here placed.

Lord Bolingbroke on the use and study of history; Voltaire's essay on universal history; Sharpe's introduction to universal history; Voltaire's present state of all nations; Dupin's universal library of historians; Salmon's present state of all nations; Usher's annals of the world; Howel's history of the world; Fresnoy's chronological table of universal history, and method of study; Priestley's chart of history; one of the best historical dictionaries is *le grand dictionnaire historique*, par M. Moreri. After reading some or all the above mentioned books, the student may then read Holberg's introduction to universal history; the universal history from the earliest account of time, compiled by several hands; or if he thinks it too bulky he may read an abridgment of it by Dr. Smollet or Kenrick, called *Smollet's present state of*
all

all nations, very well wrote ; or Kenrick's history of all nations, equally well digested ; Rollin's ancient history of the Egyptians, Carthaginians, Assyrians, Babylonians, Medes, Persians, Macedonians, and Grecians ; Josephus's history of the Jews ; Basnage's history of the Jews, being a supplement to Josephus ; Kennet's Roman antiquities ; Montesquieu's rise and fall of the Roman Empire ; Vertot's history of the revolutions of the Roman republic ; Livy's history of the Romans ; Dr. Goldsmith's abridgement of the Roman history, the best extant upon the subject ; Rollin's Roman history from the foundation of Rome to the battle of Actium, which is the end of the commonwealth ; Hooke's Roman history ; Voltaire's general history of Europe ; Campbell's present state of Europe ; Modern history, being a continuation of Rollin's ancient history ; Polybius's general history ; Voltaire's history of Charles XII. king of Sweden ; Montagu's reflections on the rise and fall of ancient republics ; Robertson's history of Charles the Vth. The first volume of this book is somewhat curious, the other two are borrowed from Voltaire, with whom he hath made so free, as not only to take his account

count of facts from him, but the most of his observations in natural history.

There is one remarkable inaccuracy in Robertson's history of Charles V. where he artfully calls all the reformers by the common name of Protestants, by which means he has an opportunity egregiously to impose upon his ignorant readers. If he gives us any more of his history, it will be but candid in him to distinguish each party of the reformers by their proper names; for he knows very well that they differ from one another near as much as they differ from the Papists; Luther calls Calvin a heretic, and Calvin returns the compliment.

One that reads history should always have Collier's historical dictionary, supplement, and appendix, at hand. By this time the student is able to read any history, and if he wishes to have a critical knowledge of the history of each country, which is a laudable ambition, he must collect as many writers of each country as he can, and compare them together, reading each reign separately by itself, and viewing the facts as they are narrated by each historian. For example, if I wish to come at a perfect knowledge

ledge of the English history, I would read Hume. But I must not entirely rely upon this history, but read as many others as I can lay my hands upon, such as Smollet, Carte, Salmon, Brady, Tyrrell, Guthrie, with Ralph's continuation; Rapin, with Tindal's continuation, and medallic history; Mortimer, Echard, Lediard, from the abdication of James II. to the accession of George I. Clarendon's history of the rebellion; Carte's life of the duke of Ormond; Oldmixon's history of the Stuarts; Burnet's history of his own time; Robertson's history of England from Julius Cæsar to Charles I. Whitlocke's memoirs of English affairs to the end of the reign of James I. Larry's history of the reign of king Charles I. Cambden's history of queen Elizabeth; the parliamentary, or constitutional history of England, from the earliest times to the restoration; Dugdale's *monasticon anglicanum*; North's examen of the reign of king Charles II. a book that merits the highest praise, and ought to be printed in letters of gold.

FOR ECCLESIASTICAL HISTORY, read Collier's ecclesiastical history of Great Britain; Du Pin's ecclesiastical history; Du Pin's history of ecclesiastical

ecclesiastical writers ; Religious ceremonies of all Nations ; Fleury's ecclesiastical history ; Bede's history of the church of England ; Burn's ecclesiastical Law, with the supplement ; Ecton's thesaurus rerum ecclesiasticarum ; Eusebius's ecclesiastical history ; Hooker's ecclesiastical polity ; Echard's ecclesiastical history ; Warner's ecclesiastical history of England.

C H A P. III.

OF PHILOSOPHY, ITS NATURE AND RISE.

AFTER attaining to a competent knowledge of history, the next part of learning to be applied to is philosophy.

Philosophy, by Cicero, is defined thus, *The knowledge of things, both divine and human.*

But the definition given of it by Pythagoras, seems to express it better. *Philosophy is the knowledge of things which are, or of beings which have real existence.* Or yet more distinctly it may be described to be, *The study and knowledge of the nature, laws, and the established connection of things, with proper reasonings thereon.*

Philosophy being the knowledge of the causes of things, therefore every thing that operates as a cause, is the object of philosophy; but every thing that exists in the universe, is some way or other employed as a cause: hence philosophy takes in the whole system of nature.

The

The several species of beings may be all reduced to two classes, *material*, or *immaterial*; hence philosophy is of two kinds.

1st. That which treats of body or material beings, called natural philosophy or physics.

2dly. That which treats of spirits or immaterial beings, called pneumatics.

Each of these are subdivided into several branches. As body is that which first presents itself to us, and by the consideration of it we form an analogical knowledge of spirit, hence the philosophy of body ought to precede that of spirit.

In natural philosophy, we often reason from motion to the forces producing them; and if we measure the quantity of the cause producing the effect, we ought, previously, to have made some progress in *mathematics*.

The universal system of things is altogether made pendent upon man, who is only a part, and perhaps a very inconsiderable part of the

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great

great whole ; for the Supreme Being, by whom the world was made, has established and settled the natures and connections of things, by laws adapted to the respective natures of the creatures, and productive of the great good of the whole ; by these laws he wisely brings about every change and alteration that is in the universe. The operations of God by these laws, or according to these settled rules, and the regular course of things produced thereby, are called the course of nature.

God has placed on this earth a great variety of sentient and perceptive beings, arising one above another in a beautiful scale and perfection ; but it is to man alone that he has granted powers and faculties fit for examining the laws and nature of the universe ; but none have such superior powers and faculties as to attain to knowledge without great labour and attention ; and whoever wishes to attain to the name of learned, must sweat, and toil, and labour ; for we come into the world intirely ignorant, and know nothing of ourselves, our connection with the rest of the world, or the relation that one bears to another. By degrees we get perceptions, and learn by experience the connection
they

they have with one another, and how alterations may be produced in things. Hence it is evident our knowledge must be acquired gradually and by piecemeal from experienced observation, and that it will always be proportionable to the extent of our experience, and the exactness of our observation.

The powers and faculties of our minds, though noble in themselves, and well fitted for our infancy of being, are narrow, limited, and unable to take in at once the whole of the august drama, with which we are presented; for when we are intent upon one science, many others pass unnoticed, and of that to which we attend, a great many parts escape the notice of the most accurate attention.

If man therefore was to enjoy no greater stock of knowledge than he himself was to gather from observation, during the short period of his life, his acquirements would be very inconsiderable. But to remedy this inconvenience, the bountiful author of nature at first made a sufficient revelation of himself and his creation to man, and has made mankind sociable creatures; and by giving us powers to communi-

cate our knowledge and observations, has enabled us to reap the benefit of the knowledge and experience of others, who have examined different parts of the universe, or perhaps, the the same parts, but with more exactness than we have done.

The knowledge of nature, its laws, and connections, is, as I said before, philosophy ; and they who apply themselves to study, and enquire into these, and from thence draw rules for life and conduct, are true philosophers.

They who consider things as they are and exist, and draw right conclusions therefrom, for the management of their life, and for governing and keeping in subjection their wild and extravagant desires, are true philosophers.

The use that every wise and considering person ought to make of philosophy, and all other learning, is to get the mastery of himself, and to know and perform his duty to God and his neighbour ; for the more learning we have, the more weapons we have put into our hands to fight against the devil, the world, and the flesh. If we have four talents committed to our care,

we shall not be justified if we lose one, and have only three to present to our Lord at his coming, when he shall demand them, at the great and terrible day. Nor shall we be rewarded as good and faithful servants, though we have all the talents committed to us, if we have not put them out to usury; for we are to improve them, seeing to whom much is given, of him much shall be required; the greater our learning is, the greater will be our condemnation, if we do not use it aright.

They who pretend to solve all things by natural causes, excluding the God who made and governs the world, from having any share in it, are not philosophers, but corrupters and enemies of true learning; and they who have no regard to fact and nature, but indulge themselves in devising systems, and imposing them upon others, to which afterwards they reduce all appearances, are to be reckoned, notwithstanding the ingenuity and fancy they may discover, amongst the enemies and perverters of learning.

In the beginning of the world men had a perfect knowledge of philosophy, pure and un-

corrupted as it came from God, but as people increased, their attention to true philosophy decreased; and error and false notions of things imperceptibly displaced true philosophy; for the more man estranged himself from God, the fountain of light and all knowledge, the more his mind became over-shadowed, darkened, and bewildered.

After the deluge, people had little time to indulge themselves in the wanton extravagancies of their own imaginations; they were contented with Noah's philosophy, which he received from the patriarchs, and the same which Adam had from God in paradise.

The attention of the generality of mankind at first, was set upon procuring the necessities of life; for upon their first settling in a country they found employment sufficient in cultivating the land, making habitations to live in, and in procuring necessities for their mutual comfort and subsistence; and their unsettled way of life was, in fact, a great benefit to the first inhabitants of the world after the deluge. Though it is generally, but erroneously believed, that at the beginning of the world, the beginnings of philosophy

philosophy were small and its progress slow, yet the very contrary of this is true. For as man is a created being he could know nothing of himself, but what he received from his creator; all his philosophy therefore was from God. And as man began to alienate himself from God through the temptations of ease and luxury, so he became more and more ignorant, and indulged himself in his own delusive speculations, which thrive best in ease and security, which they could not find for a considerable time after the deluge.

The primitive goodness and fertility of the earth had been abused and perverted by man, and instead of rendering him dependent on and thankful to his creator, was an occasion of his assuming independency, and even of deifying the earth, the immediate producer of its fruits, and of forgetting God the author and original former of all. An error man is very liable to fall into; for his situation in this life is such, that he is confined for his ideas, the foundation and inlet to all his knowledge, to sensible or material objects; and the prevailing idolatry and corrupted philosophy, both before and after the time of Moses, even almost from the crea-

tion of man to the coming of Christ, was to worship the material agents, or some part or other of the system of nature, in place of God the creator and former of all. For as men lost sight of God and true philosophy, they gradually fell into idolatry, and mistook the instruments for the cause, the subordinate agents for the supreme efficient. And as the corruption of man before the flood was remarkably great, many objects of false worship were set up, some imagining one part, others another part of the creation, to be supreme.

The three principal deities seem to have been the Air, Water, and Earth, called by the heathens Jupiter, Neptune, and Tellus.

God determined to destroy, by a flood of waters, the earth, that great god of the idolators, in order to retrench their luxury, and thereby remove one great cause of their general corruption; that by thus altering the state of the earth, man might be under a necessity to use greater labour to obtain the necessaries of life, and that he might the more easily discover their real weakness and absolute dependence upon him. For the sons of Noah, with their

their children, who were the first planters and establishers of colonies, having the world divided amongst them by their father Noah's appointment, were obliged, we may suppose, to spend some time in going from place to place, till they found out a convenient residence. When they were settled, they found the earth so barren that they could not expect food without great labour and industry; therefore they next saw it necessary to fall close to the work of husbandry, not only to get something out of the earth for their subsistence, but when, by their diligence, they had so far improved the ground, that they had not only enough for themselves but to spare to others, they then found out a way for commerce, one with another, by exchange.

This way of traffic made them begin to raise their hopes of enriching themselves; which when some of them had done, who fortunately happened to settle in the most fruitful parts, they reduced the poorer under their subjection, and reigned over them as vassals or inferiors. The rich with their vassals and dependents strove to outvie each other, thence arose wars and mutual contentions, till they who got the
better

better over their adversaries took still the greater authority into their hands.

At first every city and adjacent territory had a king or chief, subject to none, but to the lord paramount, who was one of Noah's sons, or the eldest in descent from him, and was head governor or leader of the colony, when they set out in search of settlements, and who arbitrarily portioned out the land to them upon their settlement.

These petty kings by conflicts with each other, at last brought several cities and territories under the power of one particular person, who thereby came to reign over all within his dominions; and he increasing in wealth and greatness, might perhaps become so rich, formidable, and powerful, as to be able to throw off his allegiance to his great lord and leader, and become an absolute independent potentate, a powerful and successful rebel.

Nimrod, the mighty hunter, who was, as some think, the first king, was nothing but a successful promoter of idolatry.

When the ill-concerted scheme of Babel proved abortive, the builders or idolaters, (for
Babel

Babel, was designed as an idolatrous temple) when a dispersion became unavoidable, left the idolatrous fabrick unfinished, in the possession of Nimrod, the heir of cursed Ham; he became a mighty hunter (which phrase can be proved to signify that he grew hardened in wickedness) and a prevailing seducer to idolatry.

A shepherd and a king were in those days synonymous terms; for a shepherd, says Picart, who was at the head of a numerous family, master of several flocks, and who found himself well settled in Chaldea, sent one of his children, or dependents, several leagues off, with a detachment of oxen, asses, and camels. The flock went gently on, grazing in their passage and insensibly drew farther from the true owner. In the mean time the detachment grew more numerous, and from this flock there sprung another.

The shepherd, who at first was no more than a deputy, became himself the master and father of a family; he then spared part of his wealth, and gave it, as an inheritance to that son, whom he intended should settle at a distance from him, or some dependent, whom he wished to settle further off.

We

We presume that in this manner a hundred years was time sufficient to people Europe, Asia, and Africa, very considerably, and an hundred more to people the continent of America. Let us suppose for this purpose, that at the flood Shem, Ham, and Japhet, had each twelve children, and that all these were fit for marriage about fifteen or eighteen years after the flood; it is very probable, that after they had been married twelve years, they might see a posterity of four hundred and thirty-two persons.

In this manner Noah might have been at the head of above five hundred descendents in the space of thirty years. And if we then suppose that every one of Noah's great grand children had ten children, these four hundred and thirty-two persons might have begotten four thousand three hundred and twenty-eight children in ten years time. All this might have happened in the space of half a century; so that multiplying them always by ten, and leaving an interval of about twenty or twenty-two years between one generation and another, Asia, Europe, and Africa, might have been peopled with four hundred thirty-two millions of inhabitants, a hundred and fifty years after the flood.

Methinks

Methinks this could not be disputed, were we only to have regard to the ordinary methods of propagation. 'Tis true indeed that we suppose, that every head of a family to have had ten children, when, probably, several of those chiefs might not have had near so many, but how many do we see in our days that have more than ten.

And if we consider what Bishop Burnet has told us concerning Mess. Tronchin and Calandrin, of Geneva; the former of whom, at the age of seventy five, had a hundred and fifteen children, or persons married to his children, that could call him father; and the other at the age of forty-seven, had one hundred and five persons, who were all his nephews and nieces by his brothers and sisters; if, I say, we consider these two instances, 'twill be found that our computation is modest enough, for an age, when vice, poverty, and the cares of life had not imbecilitated and destroyed man's vigour, and reduced him to the necessity of refraining from marriage.

Left the above calculations should seem unreasonable, you may attend to the following, which is founded upon scripture matter of fact.

It

It is evident from sacred history, Ex. xii. 37. that in the space of about two hundred and sixty-six years, the posterity of Jacob alone, by his twelve sons, amounted to six hundred thousand males above the age of twenty, all able to go forth to war.

Now by Mr. Graunt's observations upon the bills of mortality, it appears that above $\frac{3}{10}$ are between the age of fifteen and fifty-six, which may be near the proportion of males numbered, to the entire number of them all. So that as thirty-four is to one hundred, so must six hundred thousand be to the entire number of males of Israel at that time, which was (by the golden rule) one million seven hundred sixty-four thousand and seven hundred; to which add females near $\frac{1}{3}$ fewer, as suppose to make the sum even, one million six hundred thirty-five thousand three hundred, the total is three millions and four hundred thousand; add forty-three thousand for the Levites (not included in the former accounts) the intire sum will amount to three millions and four hundred and forty-three souls. (*Whiston's theory.*)

From what hath been said, we may see how soon the world was peopled after the flood.

After

After the first settling of the colonies, husbandry was their employment; and they contented themselves with the philosophy which Noah taught them; but as soon as peace and quietness, riches and plenty prevailed, then people turned their minds to invention and speculation, and idolatry or false philosophy kept pace with affluence and luxury. Therefore we may expect to find the beginnings of heathenish philosophy where government and society were first formed, which no doubt first took place in countries most fruitful; for in barren countries the colonies were long employed in procuring necessaries of life, and had not time for ambition and desire of superiority, which are begun and supported by luxury; and the imaginations were prevented from wandering after vain pursuit by a constant application to agriculture

Accordingly we find, that as the east is the most fruitful country, the inhabitants first formed into empires and government, and idolatry, or corrupt philosophy, took its first rise from them, and spread through the rest of the world.

Chaldæa, otherwise called Mesopotamia, seems to have been the place that first gave rise to
idolatry

idolatry and superstition, erroneously called philosophy. This being a fertile country, and nigh to mount Ararat where the ark first settled, was peopled very soon after the flood, and therefore it is natural to expect that wantonness and effeminacy would soon make its way there.

Astronomy began to be soon studied in that country, and we find, after the invention of navigation, that these eastern nations, as China, Japan, &c. retained a great deal of usefull earning and sound philosophy, though mixed with much superstition and idolatry; and the improved state of these countries was no doubt greatly owing to their being deprived of an opportunity of imbibing the superstition of other countries.

Of the countries that were soon peopled after the flood, the joint testimony of all antiquity concurs in asserting Egypt to be the first where an empire or kingdom was first established; there idolatry and superstition flourished and made great progress, being fostered under the wings of ease and security. From it the neighbouring nations borrowed their religion and philosophy; they received indeed pure gold, but along with it much dross and bad metal.

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From Egypt learning, with its inseparable hand-maid, superstition, passed along the coasts of the Mediterranean sea into Phœnicia, and the land of Canaan. The Phœnicians being a trading people, did not confine their learning, which consisted chiefly in a knowledge of mathematics, to their own nation only, but transported it to some of the neighbouring countries. They found the Greeks very ignorant in these sciences; and Cadmus, the son of Agenor, the Phœnician, was the first that carried their learning into Greece. After the Phœnician learning, which was derived from the Egyptian, was introduced into Greece, we find all the Grecian sages, that wanted to improve, travelled into Egypt.

We are much in the dark about the high Egyptian antiquities; for there are few or no monuments of Egyptian antiquities transmitted to us. The books ascribed to Hermes Trismegistus, though very antient, are spurious. The way the priests had in concealing their science and theology in enigmas, symbols, hieroglyphics, which none understood but the priests, and those whom they initiated, and the nicety of admitting initiates into their mysteries, are

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among

among the principal reasons of our ignorance of the Egyptian learning and idolatry; yet of this we are sure, that geometry, arithmetic, astronomy, and politics, were much studied in Egypt.

Next to the Egyptians the Chaldeans, Persians, and Indians, are recorded for the wisdom of their magi and bramins. The Indian bramins or gymnosophists, affected a solitary way of life, and underwent austerities; they taught the doctrine of a future state, and inculcated the offices of justice and virtue. In a word, all the antient kingdoms had their learned men. The Phœnicians had their Sanchoniathon; the Chinese had their Confucius; and the northern nations had their druids and bards.

But leaving these things which are buried in obscurity, let us come to Greece. Here we may trace the Greek learning from its original, having proper records to depend upon. These make it probable that Greece was peopled with colonies from Egypt, and the eastern nations, who carried the religion and learning of the parent country along with them. Accordingly we see that the superstition and idolatry of the antient
Greeks

Greeks bore a great resemblance to that of Egypt, consisting only of enigmas, fables, and sentences.

The poets Orpheus, Lucius, and Hesiod, are among the most antient poets of Greece, for as yet there was no separation of philosophy and poetry; the poets were the philosophers of those days. The subject upon which these old poets wrote, required them to have a considerable acquaintance with nature, and with much of the remains of primitive revelation, though by that time, much adulterated and perverted. They sung the birth of the gods, and generation of things.

Hesiod, whose theogony has been preserved to our days, has, throughout his poem, interspersed a great many moral reflections and precepts, which shews that he had not entirely lost primitive erudition.

Orpheus employed music to soften the hearts of his cotemporaries, who, about his time, through ignorance and idolatry, were become savage and barbarous; he therefore thought that music was the fittest thing to soften their

ferocity, and to gain admittance for moral precepts.

In a word, all the Greek poets seem to have possessed no small remains of primitive revelation ; and, indeed, if we consider poetry as an imitation of nature, and a conveyance of divine philosophy, every poet must be a philosopher, for he can never imitate nature who is ignorant of it ; nor communicate knowledge, which he never learned.

When the Romans extended their empire over Greece, they became acquainted with the learning of that place, and the principal citizens sent their children to Athens, to be instructed by the philosophers ; and as the professors of all sects taught there, the young Romans became partizans of this and the other sect, as it best suited their taste and inclination. So that amongst the Romans we find the learned men widely differing in their philosophy. Cicero, the orator, who did more than any other to make his countrymen acquainted with the Greek philosophy, as is evident from his philosophical writings, was himself of the new academy, and in some things an eclectic. Cato
and

and Brutus, who killed Cæsar, were stoics. Lucullus was of the old academy. Seneca, Nero's master, was a stoic. The Platonists became famous in the third and fourth centuries. Aristotle was little known till the sixth century, when Boetius translated some of his writings.

The Arabians, in the eleventh century, introduced their philosophy into Spain, and from thence arose the scholastic learning and peripatetic philosophy, which overspread all Europe, to the great detriment of religion and morals.

After the fall of the Roman empire, and the irruption of the northern nations, all Europe was buried in darkness and ignorance for a great many centuries. Any small remains of knowledge, that were to be found, were confined to the cells of monks, and to the clergy, whose chief wisdom seems to have been to render obscure and useless all knowledge, both sacred and profane, by blending it with metaphysical nonsense; and this jargon passed, at that time, for good philosophy. But the dismal

effects of the old scholastic divinity, are felt to this day in all churches.

In those days monasteries and the cells of monks were the schools for youth ; but when the day of knowledge began to dawn, universities were founded almost throughout all Europe, and professors were appointed to teach the several sciences. But they blindly giving themselves up to the peripatetic philosophy, which was at that time in fashion, made no advance in learning, but were contented to define and explain the system of the times ; and so much were they all addicted to the philosophy of the times, that any one, who would have sought after new light, was exposed to the resentment of the clergy, which commonly ended in an inquisition, torments, and death. Descartes broke through that bigotry to Aristotle's philosophy, though the philosophy, which he substituted in its room, was equally absurd and ridiculous, which Sir Isaac Newton discovered.

I should now proceed to give an account of the heathen idolatry, and its analogy with divine

vine revelation. But, in the first place, I shall here treat more largely of the institution of society, and the nature of government, for without these two we can have neither peace nor learning. For no society can exist without order, subordination, and government, and nothing but ignorance, brutality, and murder, can be where anarchy prevails; so necessary it is to have just notions of society, and the relation we bear to one another.

CHAP. IV.

OF THE INSTITUTION OF SOCIETY, AND
THE NATURE OF GOVERNMENT.

AFTER the deluge, Noah being sole heir of all the world, and lord of all the creation, was the author of the division of the world, and of private dominion; and by his last will and testament did confirm this distribution, commanding his sons not to invade any of their brethren's dominion, or injure one another, because from thence discord and civil war would necessarily flow.

So that, if we but allow ourselves to consider, we shall find that government is founded in nature, in which state there is no such thing as an equality. For the parent, by priority of natural cause, must be superiour to the children.

Yea, so necessary to the well-being of mankind is society and government, that were we to suppose people to be like grasshoppers, or locusts, or like Cadmus's men sprung up at once out of the

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the earth under us, from any pre-existent parent, all of them having equal original and power, yet a short converse one with another would have necessitated them to embody into societies.

But we christians believe, that God made man after his own image, and gave him rule and dominion over all the creatures of our sublunary world, as well over the brutes as over his own species. So that God Almighty was the original donor of the authoritative power of government, and that not to any collective body of people, (for their never was such a state of primitive freedom, or natural liberty, as is challenged) but to one only.

If Adam had never fallen, and his posterity had remained in the same innocence, yet in order to civil life, they would have been capable of civil precepts, and in reason one or more men should have had the superiority over all others, as parents over children. And the consideration of divers orders of angels, that never fell, evidenceth, that even in a state of innocency, God designed superiority and subordination,

ordination, not an equality. But since from the fall it is evident, that the irregular passions of men have caused a necessity both of rules and rulers, laws and law-makers, it was but reasonable that God should, and it is most certain that he did, design and appoint government.

God tells Eve, that her desire should be subject to her husband, and that he should rule over her; so that here is the first dominion: and the second which we find in scripture is, where God tells Cain, that his brother Abel's desire should be subject to him, and he should rule over him; and this was in consideration of his being the first born; though afterwards he slew Abel.

God gave to Adam an universal monarchical dominion over all his fellow-creatures, and over all men that should be born, as long as he should live. The like may be said of Noah; so that whatsoever property, or whatsoever share of government of any part of the world, any of their sons had, they held it all originally by gift and assignment of authority, without waiting

ing the election or consent of the people, or entering into capitulation with the people, that were to be governed by them.

So that in the infancy of the world all men were born subjects, either to him that was naturally their father, or to him who by right of primogeniture was representatively their father. That this continued for many succeeding generations, is most apparent in the blessing that Jacob and Esau received from their father Isaac. For Rebecca, knowing that such a blessing was of the same force as the last will and testament or deed of gift of a parent now is, and of much more absolute force, contrived a way to obtain the blessing of primogeniture for her son Jacob, that his brother Esau might serve him.

The families that sprung from Noah's sons, divided the earth, and gave distinction to nations; and the cadets of the first houses travelled to distant places, and exercised authority, and gave laws to their descendents; and being thus separated to settle plantations, every planer becoming by himself a father, increased to a family, and that into diverse families, these into a city,

a city, then into diverse cities, and at last into large dominions.

So that a king in the first ages of the world, was no more than a common father, either by natural right as a parent, or after by a legal right as the eldest descendant of such a father. And when the pleasantness or profitable commodiousness of one soil allured several to covet it, then war ensued, and the conqueror forced the conquered to seek other habitations, or become his slaves. And so a succession of some warlike princes enlarged their dominions to empires, and established them by laws and government.

Amongst the faithful, says Mr. Hutchinson, in the first ages the pre-eminence went by seniority, except in cases where God, who is absolute, altered the succession, or disinherited some persons on account of their infidelity; or where the father, in whom the right was, expressly deprived an unworthy son of his order by birth, as Noah deprived Ham, and made him a servant, set him below his younger brother, who owed submission to the eldest,

When

When men grew licentious, and apt to suppress the original inclination to honour their parents, that duty was enforced by writing, and what natural records suggested. Had man been left doubtful as to this grand point, or had more than one couple been created at first, no societies could have been formed; there would have been perpetual competition who should govern; nothing but a supernatural direction upon every emergency could have prevented faction, force, or discontent.

Amongst the apostate nations, that instinct which pointed out the paternal authority being over-powered, they became abject slaves to violent and ambitious tyrants.

Nothing makes men break out into greater irregularities than a supposed equality or independency; which licentious supposition tends to eradicate society, to introduce confusion and anarchy, to justify rapaciousness and brutal force. So that all manner of enormities may be traced from this pretended liberty, this perpetual source of disobedience and rebellion.

By nature children are bound to their father, as deriving from him their being, their nourishment

ment and instruction, their increase either of strength or wit: whom then could they chuse so fit to portion out and divide their inheritance, to decide their differences, to assign each his proper allotment? If the father left behind him a settlement or will, have the sons an equal right to determine its meaning, or must it be executed by a majority of votes? alas! the losing party, who thought themselves aggrieved, would not be restrained from using fraud or force, had not these inconveniencies been obviated by recourse to the eldest brother, as the most experienced, wisest, and strongest, and the natural guardian for the rest.

If it should be said, that the right of any thing belongs to the first discoverer or possessor, that may be true, were there no father or lord paramount to give sentence concerning the property; but where there is, he must be singled out as the judge and dernier resort.

Cain, though heir apparent to the world, and his brother's superior by birth, was conscious there was a person, whom he did not think fit to name, but called *every body* (when there was no man alive but his father) who had power

power to use the sword, and put him to death for murder. That this younger brother would have been subject to him in course, is clear from the text, *Unto thee shall be his desire, and thou shalt rule over him*, in the same words as God gave Adam power over his wife.

The history of the patriarchs shews occasionally, that they had, and actually exercised the chief power amongst their sons; and it is very presumable, that whenever the Most High thought proper to alter the order of succession, and reject the elder, there was some unnatural crime, impiety, or irreverence at the bottom.

Whence have proceeded those bloody wars between different princes and states for superiority? but from deserting the fatherly jurisdiction, and each pretending to chuse and carve for himself; so that men are kept in continual terror, ready for the attack.

This too shews an admirable art in providence, to draw good out of the follies of mankind; for by this vigilant emulation, particular societies being more united set their wits to work, as well to excel in arts as to be superior

rior in arms. And though the true line of descent does not now, in many cases, appear, every man is born under some supreme power, which he ought to submit to without reluctance, and he who resists it may find his doom pronounced by the apostle.

It is the highest degree of hellish policy to make religion a stalking horse for rebellion, and to entitle heaven to all the wickedness we design. You may never expect, said the royal martyr to his son, less loyalty, justice, and humanity, than from those that engage in religious rebellion; their interest is always made God's, under the colour of piety; ambitious policies do thus march, not only with the greatest security, but also with applause. You may hear from them the voice of Jacob, but you will find at last the hands of Esau.

Supreme governors are accountable to none but God, whose vicegerents they are, and by whom they are placed in this world for the general good; and they own no superior upon earth. This we may naturally and justly conclude from the frequent expressions of scripture as, *By me kings reign; kings are the ministers*

fers of God; God will give deliverance to his king, to his anointed, &c. These, and many other similar passages in scripture, plainly declare to us, that God Almighty hath reserved to himself the immediate dependence of the supreme power, in order to shut out the restless and extravagant multitude from the frequent revolutions they would make, and the dissolution they would occasion, if they had any ground to think that the supreme power depended upon them, and that they were not bound for conscience sake to obey their governors.

Why are kings stiled gods, but to denote that they were not made by men? And it is most clear that the inferior magistrates derive their power from the king, and not from the people as supreme; so from that analogy which runs in a dependence through all the creation, kings should derive their power from God alone, and so are no human ordinance and institution. Supremacy is affixed to the king, and governors are sent by him; but if the king were the creature of the people, it would have been expressed that they were commissioned or sent

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by them; whereas it is expressly said, *they are of God.*

That kings and sovereigns derive their power from God *alone*, and consequently not from the people, is attested by the joint consent of all unbiaſſed learned men; and I might make it evident, that both fathers and ſchoolmen, laymen and divines, lawyers and poets, ſcripture, councils, and canons, the laws of nature, and eſta bliſhed laws of this land, the doctrine of the church of England, and the teſtimony of both univerſities, have given their ſuffrages for the ſame, as grounded upon the moſt ſolid reaſon, and have declared, that reſiſtance is deſtructive of all government, the public peace, and the bands of human ſociety. And whoever is not convinced by theſe evidences, would not be convinced though one aroſe from the dead; and ſome there are who lend a deaf ear even to ſuch a cloud of witneſſes, and theſe we may rank under the following claſſes.

Perſons apt to be ſeditious are, *First*, The debauched; ſuch as give themſelves up to luxury, degenerate from the virtue of their anceſtors, are unbridled in their appetites, live without

out rule or order, and have no regard to the laws that should restrain them; no wonder if such people yield obedience to nothing but the impulse of sensual appetites; and as orderly government curbs these, it therefore becomes uneasy and intollerable to them.

Secondly, The vain and light airy-headed persons are fitted to father the seditious errors, that wiser and subtiler heads do fashion. These rush into action without deliberation, weary of things long used, rather chusing, for the sake of novelty, doubtful and uncertain matters, than such as are the issues of staid councils; lampoons, libels, and pamphlets, are their chief study; they are the puffing whirlwinds that raise the dust, the ignes fatui that mislead poor mortals.

Thirdly, The indigent are fitted in all respects for sedition and tumult; they are conscious of their low estates, and hope to better them in the scramble.

Fourthly, The ambitious are mighty promoters of sedition; for ambition is the prime ingredient in all factions, leading men naturally to change the model of all things civil and

sacred, that are not the product of their own council. This excites them to seek the removal of such as enjoy more honorary or beneficial places than themselves. Those honours which they despair to enjoy in a composed, they judge they may acquire in a disturbed state. They are generally the incendiaries which kindle the fire of intestine war, and are the worst pests any people can be plagued with, having rarely either religion, conscience, or honesty. Ambition is the canker-worm that preys upon peace and plenty. The ambitious man is always fearful lest he say what will displease; counterfeiting humility, honesty, affability and bountifulness; obsequious to all, that he may be praised by all; but when he hath attained his ends, he is quite another man; he then becomes proud and haughty, vain and extravagant.

Fifthly, The envious are cankered branches in a commonwealth. Envy is always at work, finding new matter to work upon, one man's higher place, another man's greater endowments, offices, or popularity trouble him. But,

Sixthly, Above all others, innovators in religion are the most dangerous to kindle factions.
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Their fire is pretended to be from heaven; their zeal warmed with a divine breath from the altar. Diversities in religion cause the greatest ferment amongst the people; from thence the part-taking, and the part-making, ill-will, hatred, contentions, and jealousies, spring up; one party hoping to rise, another party fearing it may be so, and striving to pull down or keep down another.

When you find a party of men, driving on a pretence of religion or reformation, with lies and perjuries, back-biting and slanders, tumults and insurrections, as you tender either your virtue or welfare have nothing to do with them; for you will most certainly find them a faction of hypocrites that make shew of reforming religion to undermine the government. Blessed be God we have not so learned Christ, for his religion teaches us not to do the least evil, tho' the greatest good may come of it.

These unhappy lands have so long abounded with people of all the above classes, that rich and poor, high and low, learned and ignorant, are at this time so deluded and lead astray by the ideal name of liberty, that they have entirely

lost the knowledge of the nature of government. This consideration hath induced me to be much fuller upon this head than at first I designed, or perhaps the nature of my subject required, that sincere christians, who desire to serve God in the strict observance of his sacred institutions, and in a dutiful obedience to the laws of the land, may not be led away by the example or precept of any who differ from the word of God, or run counter to the laws of the land.

It is an easy thing for men to be deceived by the specious name of liberty, and for want of judgment to distinguish, mistake that for their prime inheritance or birth-right, which is the right of the public only: and when the same error is confirmed by writers upon the subject, it is no wonder if it produces sedition and rebellion; and people by reading these variable mercenary scriblers, have got, from their very childhood, a habit of favouring tumults, of licentiously controuling the actions of their sovereigns, and being always dissatisfied with the present: but it is the weakness or voice of corrupt nature to be delighted with novelty, preferring imaginary prospects to present happiness;

to despise what we enjoy, though often wishing for it again in vain.

Yet however inconstant and fickle people in general may be, a good man will never turn his back upon truth; nor will he be either afraid or ashamed to own and maintain it, however unfashionable it may be; for a good cause is never to be despaired of. God Almighty, when he hath punished us for our sins, will again look upon us in mercy, and open our eyes to see our duty, and endow us with fortitude and resolution to perform it. Then we shall *render unto Cæsar the things that are Cæsar's, and unto God the things that are God's*. We shall not then, in a tumultuous and riotous manner, rob majesty of any of its sacred dignity, nor the crown of any of its royal prerogatives. Though right and justice may for a time rest and be put to silence, yet it rotteth not, neither will it perish. The multitude are as inconstant as the weather; nothing being so familiar with them as the change of their affections, not being led to judge of things by choice and wisdom; *sed impetu & quadam æmeritate!* Their wills and appetites are as various as their features and countenances; no-

thing catches the mob more than popular declamations, whereby the authority of superiors is lessened, and the advantages and strength of the people magnified; until at length they arrive at that height of insolence, that they neither honour their king, nor obey his laws; whence posterity often find reason to heap curses and direful execrations on their hated memories.

The sad experience of this nation in particular, testifies how apt many people are to be decoyed into gross mistakes, and to be abused and misled by fair speeches of discontented and aspiring men, to draw up heavy charges against excellent governours, and to conclude their ruin and destruction to be designed, where there is not the smallest intention to hurt him. Besides, gross falsehoods easily pass, with the credulous vulgar, undetected; and it is easy to persuade them, when the mistakes or bad management of any in power and commission are detected, to account those the faults of the rulers who did not prevent or restrain them. Whereas it was a great truth which was asserted by bishop Sanderfon, "That in the best
" constituted commonwealth there are not a
" few things amiss, which the utmost care and
" industry

“ industry of rulers, and the severities of the
 “ laws, are not sufficient wholly to prevent or
 “ cure.” Let us therefore hearken to what
 God says, who is infinitely wiser than man,
 when he forbids us to follow the multitude to
 do evil; that is, when they decline from what
 is just and honest.

Amongst christians regard is to be had to
 what is right and honest, what is pious and
 just. Let us therefore at all times adhere close
 to our duty, as well when it is against our tem-
 poral interest, as when it is for it. Let us in all
 things inviolably observe the commands of our
 religion, and the laws of our country.

CHAP. V.

OF THE HEATHEN IDOLATRY, OR FALSE PHILOSOPHY; AND ITS ANALOGY TO TRUE PHILOSOPHY, OR DIVINE REVELATION.

THE antients were not, as is generally and erroneously supposed, ignorant of true philosophy. Much good and useful learning may be found amongst their writings: divest them only of idolatry, and you shall find treasures of sound learning.

Their idolatry, I mean that which was first set up, is itself a proof of their physical knowledge, or thorough acquaintance with the general system of nature. It began very early; and was probably, in proportion as it descended and became more and more gross and corrupt, (which it gradually did) a mean of corrupting their philosophy; so that before Moses's time it is not improbable but that true physical knowledge was greatly obscured, as we are sure their theological was grossly corrupt and erroneous.

It

It needs not be matter of wonder that the ancients, when they had lost the knowledge of the great Creator, should commence worshippers of those physical agents, which were the most perfect representations both of the existence and power of the deity. They knew, both by tradition and experience, that, in a physical sense, they owed their existence and support to the agency of the heavens in their threefold state of fire, light, and spirit; and, knowing nothing superior thereto, it was natural enough to ascribe divine attributes to them.

And though in this they exactly corresponded to the character given of them by St. Paul in his epistle to the Romans; yet can it be said they were more stupid than some among the moderns? Who though they profess to know God, and in words ascribe omnipotence and other incommunicable attributes to him, have nevertheless robbed him of those attributes; sometimes ascribing such powers and properties to matter, space, and motion, such virtues to occult qualities, and such limits to what they call the unalterable laws of nature, as to refuse to the supreme architect the power of controuling the operations of his own machine, while at
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the same time they make the *immediate* application of his hand necessary for the production of every phenomenon.

The antients certainly understood the settled operations of the heavens; but forgetting that they had a beginning, and were under the controul of a superior power, they concluded them full of understanding, and proper objects of worship: hence they worshipped and served the creature instead of the creator.

All the ceremonies and precepts under the law, among other intentions, were designed to expose some idolatrous worship of the antients, that the rivalship between God, and what he had created, might evidently appear; and to shew that God was the creator of the heavens and the earth, that people thereby might be put in mind to whom alone, with humility and thankfulness, their adoration was due.

The nations, given up to imagination, set up signs of such powers as they conceived in their deities, and were suited to represent the majesty, glory, agility, or circulating force of the heavens or airs, such as rings, or other en-
signs

signs and ornaments, doves or eagles from their swiftness and soaring, bulls and other horned animals from their strength, the lion from his vivacity, &c. At length the names of their gods were assumed by princes and great men, as the highest mark of honour.

The antients were not stupid; the virtues, powers and operations of the air, their *Baalim*, or *Jupiter*, they saw with admiration; it conquered, and they worshipped. To the host of heaven they erected their high places, groves, altars, monuments, and called their cities and temples after their names.

Those modern heathens, the fluctuating *Greeks*, and the more ignorant *Romans*, with their anxious copiers, our *modern fashionable philosophers*, losing sight of true philosophy, set up new schemes, invested matter with imaginary powers; and thereby have declared themselves ignorant of that spirit and matter which their predecessors bowed down to and worshipped.

The heathens, most certainly, took their religion and philosophy from believers, who, before Moses introduced writing, had no way
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of conveying knowledge but by pictures, symbols, or hieroglyphics. This is evident from the characters Jacob gives of his sons, and none doubt it, who are versant in the learning of those early times, and know any thing of the Egyptian hieroglyphics. The use of symbols spread from thence among the Greek philosophers, who were, as I before observed, indebted to the Egyptians for the most of their knowledge.

It was the custom of the Egyptians to wrap up all their knowledge, or rather all their ignorance, under mystical representations, clogged with two inconveniencies very unsuitable to the propagation of knowledge, i. e. obscurity and ambiguity : and as the other way of communicating knowledge by a vocal *cabala*, was likewise imperfect, as words are of so perishing a nature, and man's memory so weak to retain any thing, it was necessary for the certain communication of knowledge, that some way should be found out more lasting than words, more firm than memory, more faithful than tradition, and more intelligible than symbols. But how to express all kinds of sounds with the several draughts of a pen, and to confine them within the

the compass of twenty-four letters, is deservedly called, by Galileo, *admirandum omnium inventionum signaculum*. Every nation claims the inventor; the Jews derive them from Moses, the Egyptians attribute the invention to Mercury, the Greeks to Cadmus, the Phœnicians to Taaulus, the Latins to Saturn; but Mr. Johnson, in the preface to his sermon preached at Canterbury school-feast, hath to a demonstration proved, that there were no alphabetical letters before Moses, and that he was taught by God, it being past the invention of man to discover.

Before Moses's time then there was no other way of transmitting the knowledge and memory of what all the descendents and successors of Adam were infinitely concerned to learn and know, than by transmitting the very images of the things, or by oral instruction.

This tradition, whether hieroglyphical or verbal, was handed down to Moses by his forefathers. He did not learn his philosophy in Egypt, as is rashly and erroneously believed by many; he had indeed a thorough insight into the national wisdom of that country; as David and his cotemporaries were well acquainted with

with that of Chaldea : but as this science among the heathens, was by this time extremely defective and corrupt, so the Hebrew law-giver needed not its aid, while instructed by him, who is the alone source of all knowledge.

Writing being out of the question, Moses could never receive perfect knowledge of such antient facts, as he delivers, from tradition alone, which was by that time polluted with imagination, but must have had the whole revealed to him, either immediately from God, or from his prophets the patriarchs.

Every human system of philosophy, hitherto devised, palpably confutes itself: and how can it be otherwise? *Where wast thou when I laid the foundation of the earth?* Job. xxxvii. 4.

But Moses's philosophy will through all ages stand as firm and unchangeable, as the rock of truth from whence it came.

When the principia of Moses come to be more minutely examined, explained, and understood, the antients will be rescued from their fancied ignorance; and it will appear a notorious

ous error to imagine it was brought to light by a few fancied discoveries in our own age. For true philosophy is contained in the scriptures, which were dictated by him, who must be infinitely well acquainted with his own workmanship, and could have no intention to palm manifest falsehoods upon his chosen people. His philosophy, the unerring philosophy, was known, expressed, contested, and determined many thousand years beyond what is falsely called antiquity. For the Greeks, out of whose rubbish the systems now in vogue are stolen and patched up, were not only the latest, but the most ignorant of the gentiles, except the Romans.

One who wishes to attain to a knowledge of philosophy, cannot pretend to acquire it by searching the writings of the heathen, who were perpetually fluctuating and groping in the dark; nor by experiments alone, which are liable to a thousand uncertainties; but only by recurring to the holy scriptures. The first method Des Cartes and his predecessors pursued; the second was the plan Sir Isaac Newton followed; but the last method is the way in
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which

which Mr. Hutchinson and his followers, and all lovers of true learning, walk.

As the eye is the chief inlet to knowledge, so emblems and substitutes were pitched upon to record and preserve the idea of a God, till the gentiles had wickedly perverted all the antient institutions, and given themselves up to imagination, whereby they were disabled from ascending higher than to the material rulers of this world, and so were immersed in idolatry, by taking up their rest in second causes, &c.

When they lost the knowledge of the limited condition of the heavens, they imagined them infinite, and founded hypotheses upon that idle notion. The agency of the heavens displays those types, whereby God has been pleased to convey ideas of his own essence: and as God was primarily represented by the heavens, so the heavens were the prime object of idolatry; and the wildest of the Americans, the Carabbees, without either letters or writing, were found to worship a deity by the name of *Chemim* or *Cemim*, almost the original word for heavens. And were it practicable at this time of day, to produce all that concerned the

the names, images, insignia, emblems, ornaments, temples, altars, and their apparatus, as the sacerdotal habits, sacrifices, services, games, with the confessions, prayers, hymns, &c. belonging to the heathen gods and their idolatry, the language of the bible might be better understood; for they would prove useful interpreters of each other, and we should find, that much of the heathen religion, had its rise from some corrupt and mistaken notion of revelation, or divine philosophy.

The primeval instruction was concise, uniform, and perfect; but the gentiles, by absurd additions and combinations, rendered it perplexed, operose, and disjointed. They forced asunder the true hieroglyphics, and varied them according to their own vain suggestions: but they knew the use of these memorials too well entirely to throw them aside; on the contrary, they retained them to the very last. So that Apuleius tells us, when he was initiated into the heathen mysteries, the priest brought him a book filled *litteris ignorabilibus*, with strange characters, and the figures of certain animals with knots and rotular turnings, twisted together like the tendrils of a vine.

The antient heathens could not plunge all at once into atheism; for they knew at first, that the heavens were only a machine, and no more than a created image of the divine powers. They began by imagining that God had left this system to the management of the modifications of matter, out of which it was formed, and that they, as his illustrious vicegerents and intervening ministers between him and the human race, deserved a superior regard. Then they reasoned themselves into a strong persuasion, after they had ungratefully forgotten and given up the supreme object of faith, that sense and human reason, that treacherous reed, was their guide, and the heavens their God. And by degrees they grew so perfectly stupid, that they lost all knowledge, not only of the glorious trinity in the God-head, but even the trinity of mechanical agents, *fire*, *light*, and *spirit*, which their forefathers knew so well, and were so fond of, and which is so noble and just an emblem of the holy and ever adorable trinity and unity in the God-head; for *fire*, *light*, and *spirit*, are three in one, and one under three modifications; for fire is light in a different or more rarified state, and light is spirit somewhat more attenuated than when it existed in its storkened, congealed, and frozen state, and these

these three are one, out of which all this material frame sprung : so the Father is God, the Son is God, and the Holy Ghost is God, and these three are not three Gods but one God, who gave being to all things, whether material or immaterial, that are or shall be to all eternity.

In this bewildered state did the Son of God find the heathen world, when they were in such a strait for deities, that they gave the compliment of Apotheosis to one another, to kings, to bloody tyrants, to any who had pride, ambition, and impudence enough to lay claim to their adoration. Egypt, that abandoned nation, which is described as an adulterous woman, lying with beasts, the parent of monsters, made heifers, goats, pigeons, &c. their gods; therefore these representative gods of that beastly and idolatrous nation, were appointed to be sacrificed by the Israelites to God, as a solemn acknowledgment, that he was sole master of the powers they were symbols of. And whatever rival power was put up in opposition to God, the scriptures always use proper expressions to reclaim that power as belonging to God, as *the God of beaven, the God of Hosts, &c.* and the miracles, judgments, or testimonies, were

all so contrived, either in general or particular, as to determine the controversy who is God. Among the animal representations of the æther and its various powers, the serpent was one of principal note; hence Aaron's rod turned into that reptile, which the heathen idolized; and when the magicians had, by their slight of hand, mimicked the miracle, his rod swallowed up theirs.

The sun and moon were principal objects of the heathen worship, therefore at Joshua's prayer the light of these two bodies was arrested, till his enemies, the worshippers of light, were vanquished. The idolaters pretended their gods could give them plenty, health, foretel events, &c. God gave his people miraculous supplies, or in judgement withheld fruitful seasons, sent famine and sickness, and endowed his faithful servants with true visions and infallible prophecy. All the host of heaven was worshipped by the heathens, therefore fully to demonstrate his power over them, and to shew them that he was lord of heaven and earth, God makes them act out of course, or contrary to that mechanism, which the antients knew they exercised. As the light was the grand object
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of idolatry, the immortal light had not only power to controul his mechanical viceroy, but shewed himself vested with all the insignia of omnipotence.

The Athenians well expressed their ignorance by the inscription which St. Paul found *to the unknown God*, whom they understood to be an invisible power in the heavens; this afforded the apostle a fit opportunity to refresh their memory as to its powers and properties, which once they were no strangers to, and which St. Paul reclaims, as belonging to God alone, who created and made the world, and is lord of heaven and earth: this was new doctrine to them, who thought that God was strictly in every place. They had long mistaken the pompous embassador for his infinitely more illustrious sovereign. The material god was better adapted to their gross imaginations, and the Most High was to them *incertus*. Their philosophy is well expressed by Aratus in that famous passage, so much esteemed by our modern deists, where he says;

From Jove we spring, shall Jove be then unsung,
Jove who to sing enables every tongue!

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Where'er

Where'er we mortals go, where'er we move,
 Our forums, cities, streets are full of Jove:
 He flows the swelling ebbs, the falling tide,
 With him in harbour safe the vessels ride.
 We feel him, taste him, breathe him everywhere,
 And all in common his kind influence share.

Virgil refers to this philosophy when he says, *Jovis omnia plena*. The stoics and many of the Grecian wise men differed little from this philosophy; their god was *light* and *air*; mistaking the inferior agents, the servants for the master. Orpheus teaches this philosophy in his verses.

Jove is the spirit of all nature's frame,
 Blows in the wind, and blazes in the flame;
 The deep beneath, the radiant sun above,
 The moon's reflected light, are parts of Jove,

Ennius says,

Behold this great sublime, that glows above,
 Which all conspire to name celestial Jove.

The gross air, their *Juno*, was the causer of winds, and these two, *light* and *air*, they deified; such was the oriental religion or philosophy, which descended to Pythagoras, Plato, Aristotle,

Aristotle, Seneca, Pliny, &c. As the air was their *Juno*, so the change of the air into fire was insinuated by the birth of *Vulcan*.

The Egyptians, the first and prime idolaters, thought fire an animal; the Persians thought it a god, and as Strabo says, offered food to it, with an invitation *Lord fire eat*. The Egyptian apis or bull, and the Libyan ram, were dedicated to the lord *fire*, whose operation, nature, and benefits, they were no strangers to. The Canaanites had a temple to the giver of health, and the Persians called the Sun *xupor*, and their prince and monarch by the name of *Cyrus*. The Ethiopians too worshiped it as a God.

The heathens not only stole their idolatrous philosophy from revelation, which they, to their own condemnation perverted, but also the alphabet, which was given to Moses. The mixed multitude of the heathens, which followed the Hebrew camp, whatever their motives for so doing might be, as most probably it was for protection, were, for their mutinies, punished by fire, and from the severities they met with, most probably deserted, and like those, upon whom their names descended, viz. the *Arabs*,
bians,

bians, betook themselves to wilderesses, and removed from place to place for the sake of pasture. Ptolomy, the geographer, names the later Arabs, wandering *Nomades* and *Scenites*, or dwellers in tents. Pliny and Strabo describe them as strolling about in the same uncertain manner; and it is well known how much these banditti have been dreaded by unguarded travellers. With these vagrants, the idolatrous Canaanites, driven from their country by *Joshua*, would not be unmeet companions. Some inscriptions witness that they fled to the utmost parts of Africa; while others might, and probably did, betake themselves to Phœnicia, or the sea coasts; where it appears they vended their poison to the Greeks, along with the letters they had opportunity to steal from the Hebrews. The heathens thus possessed of a pilfered alphabet, would, as they did with every thing else, corrupt it, by mistaking the powers of the letters, inverting their order, or forming arbitrary, intricate, and unsettled words of them; hence ignorance must ensue. And as soon as they learned to write, however imperfectly, they began to lay aside, and so by degrees lost, the knowledge of their hieroglyphy, or sacred emblems, which did not fail to bring with it an utter disregard

regard for the religion of their fore-fathers ; for as they had long ago abandoned the most high God, the material agents too, *fire, light, and spirit*, and their operations, grew unknown, and so the sense of supposed obligation to them ceased, whereby the attention had little left to exercise itself, but in hunting after fame by military exploits ; and when tired and cloyed with that amusement, to muster up and complete the errors of imagination, vast volumes were compiled, and every man of genius and invention, fell to work to form a system of philosophy for himself ; then guessing and conjecturing without evidence, was first called reasoning ; and imagination, once indulged, led mortals into a labyrinth of errors, which produced all those wild and extravagant systems of philosophy, which prevailed before Des Cartes.

Ambition and self-sufficiency led the heathens, who had no revelation to guide them, except by corrupt tradition, into all the wildness of imagination, and they were in some measure excusable. But those who are favoured with unerring knowledge, the fountain of all true philosophy, Revelation, and do not apply to it
to

to learn nature and its laws, are most inexcusable.

The excessive regard to what is called human learning has raised many to the high appellation of scholars, whose knowledge chiefly consists in words and opinions; but it is at the same time one main reason, why simple nature is so much neglected, and her operations so little known and explained.

The man who would be wise to some purpose, must learn things, and there is no need of having his head uselessly loaded with a variety of sentiments in so many different languages; he is to judge for himself, after careful inspection, therefore he must have an extensive capacity, and a large share of good sense to take in and compare many ideas at once, and to draw just conclusions; with so much skill in mathematics, as to enable him, when 'tis necessary, to calculate the proportions that objects have to one another. 'Tis to no purpose to have ones head filled with mathematical principles of natural philosophy, till the principles themselves are simply proved: for mathematics are applicable

cable to any *data*, real or imaginary, true or false.

All things were framed by measure, weight, and proportion; but the works of God, either natural or spiritual, are unsearchable without revelation.

If a man, by observing and reasoning, and turning over a parcel of old heathenish rubbish, could find out that the material agents were only an inanimate machine, and what such a machine could do, with the stated laws and property of matter, he might naturally conclude, that there required some superior being to put them in motion, and to form plants and animals for them to operate upon. But this is so far from being the case, that no one, without the benefit of revelation, ever dreamed or could dream of the dependent state of the universe. On the contrary, the wisest of the heathens made the heavens their *Jupiter optimus maximus*.

It is natural to man to reason sufficiently just upon given premises, whether imaginary or real; but if he proceeds upon false evidence, the conclusions

clusions will necessarily be false ; and ignorance of *revelation*, were only sufficient premises are to be found (for that alone teaches the power and operations of the machine) has produced a world of absurdities, as one falsehood produces another. To understand, therefore, and contemplate the works of God, and to make solemn acknowledgments of his power, we must with all due humility apply to the scriptures, and not to those musty bulky volumes of heathenish superstition, to which Des Cartes paid too much attention : for he shut himself up in his closet with these monuments of superstition, and by the assistance of these, and his own fruitful genius, he formed his philosophy.

But the great and illustrious Sir Isaac Newton went another way to work ; he laid aside all that idolatrous rubbish, which, 'till his time, had so much respect paid to it. He applied for the investigation of truth to experiments, and no doubt made many learned and useful discoveries ; and his great and uncommon capacity would have enabled him, with sufficient *data*, to have made wonderful progress, and to have left behind him a still more deservedly immortal name ; a name indeed he hath left, which will be remembered as long

as learning is known, and will be respected by all lovers of learning, But experiments alone are not sufficient to enable one to find out the truth.

Had man, when created, been left to himself, destitute of supernatural instruction, he would have remained utterly ignorant of the nature and manner of the creation, and of all spiritual things; nor would his light within and without, have afforded him the least help to form notions of a separate state, which can only be exhibited by types and emblems, learned from revelation, and apprehended by faith.

The main source of apostacy, of ignorance, and irreligion, has been each setting up his reason or imagination, as the only rule of his conduct; the taking truths delivered by tradition, as no more than human discoveries, and so concluding that the light of nature is sufficient to discover the existence of God, the immateriality and immortality of the soul, a future state, the revolutions of the heavens, and the laws of matter.

Though there were always some footsteps of revelation, even in the darkest ages of the world,

world, and amongst the most savage and brutal idolaters (for I have evidently shewn idolatry arose from a corruption of revelation) yet it is easy to observe, that those who gave up tradition, and so had no *data* to go on, were utterly at a loss; nay absolutely unable, with all their boasted genius and reasoning, to rear up one demonstration of any single important article of religion, or give any rational account of the creation and revolution of the heavens; for how is it possible they should, as God justly asks, Job. xxxviii. 4. Where wast thou when I laid the foundation of the heavens?

No man, when and where revelation was defaced, or in a great measure lost, could ever prove that he even had a soul, or immaterial and immortal part; the highest notion men devised of the soul, was that it must be a particle of air; and when out of the body was to be mixed with that which they supposed to be their God.

Reasoning is not the mere comparing and weighing material objects together, which brutes in many cases seem infallibly to do; but it chiefly consists in comparing things of a quite different

different nature, the visible with the invisible system; which can only be seen by analogy. Reason, then, with respect to religious and supernatural subjects, is incapable of exerting itself until it be first informed by revelation; and then as all our ideas are borrowed from things below, or from the objects of sense, so, by analogy, these ideas are transferred to things above, or to the objects of intellect.

Without revelation, Adam could never have known any thing of the *essence existing*, the creator of this system, or of the analogy between material or immaterial objects. He could not know the world to be produced from nothing, as he was no spectator of that action, unless God had convinced him of his own power and supremacy, instructed him that it was his workmanship, and that he alone was to be obeyed. As man was created, he could have nothing within or without, but what the creator gave him, nor enjoy any thing otherwise than as he pleased to appoint. If man at his creation was limited to sense, as all men without instruction most certainly now are, he had no power to know what was a day backward, or what would be a day forward; so being entirely destitute of

data to reason upon, there was a necessity for his being taught by immediate revelation. To this the great Sir Isaac Newton does not seem to have paid proper attention. This ingenious man shewed the pregnancy of a great genius and was an able mathematician, and had a wonderful capacity for making calculations, and discovering the proportions of things : but mathematics, as I said before, are applicable to any *data*, true or false ; therefore they ought to have nothing to do with this dispute, and ought always to take the last place in science ; for no man would willingly wish to spend his time in proportioning falsehoods.

No naturalist, let his parts be ever so acute, can do more than shew one sort of matter moved and acted upon by another, and so backward and forward, till it be out of his reach. Nothing but great ignorance can lead him to attribute any properties to inanimate atoms, but solidity, bounded by surface and figure, and liable to impulse. But to say that matter can act without means or contact, is very absurd ; and it is equally so to call in the aid of a God, every now and then, and make him act arbitrarily to untie a knot that baffles the theorist's skill ;
and

and nothing can be more ridiculous than to run to occult qualities, and to turn philosophy into an *ipse dixit*.

We ought to reject all unmeaning terms in philosophy, which were only used to express those powers and operations in nature we do not understand. All chance or accident should be excluded, so far as these words are made to denote any thing irregular in the divine workmanship; for every phenomenon in the universe, is the effect of infinite wisdom and design, which can only come to our knowledge through the channel of divine revelation. This the ever great and memorable Mr. Hutchinson seems clearly to have apprehended. That light of the age, and dispeller of darkness, not only threw off the antient figments of superstition and idolatry, but discovered that his great cotemporary Sir Isaac Newton had set out upon a wrong plan, and was walking in a deceitful path: this recoverer of true philosophy clearly saw, that true knowledge must come from God alone, and that he had made a sufficient revelation thereof in the scriptures, which he laid hold of as his sure anchor, and constituted them his guide and instructor; and to understand them the better,

he applied himself to the study of the Hebrew, the original language in which they were written ; for he found, that the heathen idolaters, jewish apostates, and christian heretics, with our modern paraphrases, commentaries, and false interpretations and traditions, had rendered them very ambiguous and unintelligible.

There is no doubt but the hieroglyphical appearances, and vocal instructions, immediately after the fall, and downwards, were very complete, and perfectly understood ; but in process of time, men began to forget the prime cause of all things, perverted the symbolical appearances, turned their beautiful descriptions and representations into nonsense, and bewildered themselves in absurdities ; tore and mangled the sacred symbols, perverted divine revelation, and worshipped the creature in place of the creator.

They adored the bull, by the name of Serapis ; the lion, by the name of Mithras ; hence the figures of men, beasts, birds with wings, crowns, or other insignia of divinity, are found about temples, altars, sepulchres, &c.

As human wit was utterly insufficient for the discovery of what is now conveyed to us by revelation, so human means were not able to preserve it pure; nothing less than a succession of prophets, influenced and directed by God, was equal to the important task. Therefore, that the pure and uncorrupted truth might never be lost from the earth, and that apostacy, and false philosophy, which is idolatry, might not carry all before it, God had patriarchs and prophets to preserve the sacred depositum.

The high importance and extent of the primeval knowledge, required very long lives, that the patriarchs might communicate it to their children, and not leave them to the precarious fruits of their own experience and imagination.

Adam was the immediate fountain of philosophy to all his posterity; and except we search for it in that channel, we shall labour in vain, and grope in the dark. For unto Adam was revelation made; as it was absolutely requisite for him to be acquainted with the agents, motions, and powers of this system, because from them alone he was to be allowed to take ideas of the

great author of his being; the laws also by which they were ruled, and the obedience they never ceased to pay to their sovereign, was to be a continual pattern and example for his imitation. And as his temptation was to rise from the false suggestions of powers in this system, which it had not, it was very proper to forewarn him, by making him fully acquainted with the extent of their jurisdiction.

Though we may believe Adam formed with an aptitude to attain to all perfection human nature is capable of, what progress could he have made in knowledge, without being initiated into its first principles, and taught their use? None surely; or, at most, such as must be extremely vague and uncertain. Wherefore it is not to be doubted that God would instruct him.

But the whole universe was too large a field for a solitary creature to range in quest of knowledge, where the magnitude and variety of objects were enough to confound his senses; therefore paradise was so planted from the center to the circumference, as to represent the motions, courses, distances, &c. in the heavens, by way
of

of plan of the celestial system in miniature. For man is so circumstanced, in this life, that he has no means of attaining knowledge but by those of the senses, which must be operated upon by material objects.

All descriptions of the deity are formed from the representation of things in the natural world, and those words of divinity are without meaning, which do not express ideas taken from nature; therefore metaphysics, or abstracted notions, must be given up, seeing no idea comes into the mind, but from without, and through the medium of the senses; which holds good, even in the case of extraordinary revelations.

Adam, the root of human nature, was formed for noble purposes, to be tried, proved, and qualified for a state of immediate communication with his Creator; for this purpose he was favoured, and instructed in a very extraordinary manner, by means of emblems in paradise; and so far was he from an intuitive knowledge of God, that even after he had been taught, sense got the victory over faith; he listened to his sensual companion, took the agents for the deity, forfeited the divine protection,

tegrity, and exposed himself to the punishment due to his crimes.

As he had forfeited paradise by supposing incommunicable powers in matter, one intent of the sacred symbols was to keep God's people from falling into the same; for the temple was actually a prospect of the heavens in miniature, Heb. vii. 5. *The tabernacle was the shadow of heavenly things.* The other intent of sacred symbols was to prefigure the perfect obedience and great sacrifice of one, who was to bring about the restoration of Adam's fallen race.

Man was made capable of acquiring and receiving knowledge from given ideas, and his freedom consisted in chusing whether to enjoy perpetual felicity under the special direction of the most high God, or to trust his own fancied abilities, and subject himself to all the uncertainties of reasoning without evidence, and thereby forfeit his claim to the divine protection.

The event was mournful; for imagination got the victory. Adam began to think himself sufficiently equipped to stand alone; his heart grew

grew elate with the consciousness of his own dignity, and the light and strength of nature, which appeared to him inherent, dazzled his weak and unguarded eyes. In fine, imagination must have been his ruin, had not the divine mercy, in a most stupendous manner, interposed for his deliverance.

The evidence that Adam had of the existence and power of God, was limited in proportion to his state; he being the last of God's works, could not see how the other creatures were formed. He found the natural agents cherished all things, and rendered them prolific; so that there was no other recourse but to depend implicitly upon the veracity of that being, who revealed himself to be the author of this system. He might indeed be assured of God's supremacy, by his summoning the animals before him to receive their names; and of his wisdom, by making them discover so much of their nature and properties, as to enable Adam to distinguish them by proper names and suitable denominations; by discovering to him the properties and powers of the three material agents, fire, light, and spirit, types of the God-head, Father, Son, and Holy Ghost; and by figura-

tive

tive institutions : of these paradise was the first, and being planned out by wisdom itself, for the information of a perfect man, was, no doubt, beyond comparison, exquisitely curious.

The consecrated groves, both amongst believers and idolaters, were but faint resemblances of paradise, though the imitation was so tenaciously retained by the heathens, that they scarce knew how to separate a temple from an arbour. They surrounded their very altars with groves; and even to the last, when tradition was utterly corrupted, the branches and fruits, carried in all their solemn processions, shew the decayed vestiges of antiquity.

The heathens had a variety of animal and vegetable hieroglyphics sacred to their deities, which custom even yet prevails in the most distant and barbarous parts of the world : Thus Orpheus sings :

Boughs represent our mortal state below;
Like them we perish, and like them we grow.
Fate stands not still, nor lets things keep their ground,
But runs one constant circulating round.

Erasmus Stella says, the Persians worshipped serpents, wild beasts, and trees. St. Oderic says,
that

that the East Indians adore fire, serpents, and trees. Joseph Acofta fays, that in America the kinds of trees dedicated to their refpective dieties are continually preferved; as the beech to Jupiter; “ We believe them to be, fays he, “ as it were, attributes of heaven.”

Among the old Romans, none durft cut down a grove within his own ground, till he had offered a fwine in facrifice to appeafe the gods. Our old druids, or priefts, had their religious worfhip in confecrated groves. Here are evident proofs of corrupted traditions. Trees were defigned at firft as an emblem of paradife, but afterwards deified; the ferpent alfo, in memory of Adam’s fall by the feduction of a ferpent; and fire, as the moft active element, which they miftook for its creator.

But God Almighty, in order to preferve his people from paying idolatrous refpect to thefe objects, commanded the Hebrews, at the feaft of tabernacles, to cut down branches of the heathenifh representative trees, for building booths, making proceffions, &c.

The heathens, after they deferted God, ftill retained the animal representatives of their material

terial God, the heavens; they took the bull's head alone, and consecrated it to the fire they worshipped; the lion's to the light; the eagle's to the air; sometimes they joined two, at others three heads, and when through ignorance and imagination, they had lost the true emblems, they made ridiculous compounds of the heads of men, dogs, horses, wolves, &c. but most of them were tricepites. The power of almost all the gods is shewn by a three-fold symbol, as Jupiter's three-forked thunder, the trident of Neptune, Pluto's dog with three heads, alluding to the three material agents in the universe, which are designed to represent the Trinity in the God-head.

They knowing at first the nature of the expanse, heavens, or air, and its different states or conditions, rested upon the agents, and could carry their ideas no higher; they therefore constituted the heavens their deity, but they strangely mangled him, making him a god of each of the several attributes or conditions, which most affected them with love, dread, or admiration; the complex Numen of the first idolater, was the powers of the heavens, or air, in its threefold state; hence the Psalmist challengeth

length all the host of heaven to praise God, *praise him all his hosts*, Pf. cxlviii. 2. meaning the potent fluid air in its three conditions; that part of it in the action of fire at the sun; the streams of light from sun, moon, and stars; and the grains of air returning inwards from the circumference, to supply the flaming orb at the center with fuel.

This the later heathens divided into troops of deities. The action or agency of the central fire in mingling and mixing the gross air, and thereby fabricating it into light, was worshipped by the heathens as a deity, hence Jupiter; Belus, and the cloud-mongers augurs, were special votaries of this god. The Canaanites had a temple to the clouds. To the impulse of the spirit or grains of air in motion, most powerful effects are attributed, and the construction of its parts for that purpose is asserted to be the Almighty's work, and he challenges it as peculiarly belonging to him. It is called in scripture the Spirit of God; its adhesion in grains prevents its entering the smaller pores of bodies, so it becomes an instrument of support, and at once bears up and impels them.

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This power is symbolized in scripture by wings, whereby also it was represented amongst the heathens. The moderns called it air, aether, anima, or spiritus, according to the ideas they had of it. From it Egypt had its old name *Aeria*; as *Aethiopia* was called *Aetheria*, in the fragment of Sanchoniathon, "Jupiter's wing" is the spirit of God, which enlivens the "whole world." This they pictured by the wings of a hawk, and to this they consecrated their *van*, or winnowing instrument, which they made so necessary in all their initiations.

The Canaanites had a temple dedicated to the circle the earth describes round the sun in a year, and worshipped in it by dancing joyfully in circles or rings; and as an acknowledgment of its power, they dedicated bracelets, ear-rings, and other annular ornaments.

To the expansion, firmament, or heavens, the heathens ascribed the carriage and support of the orbs, imaging or representing it by wings, wheels, chariots, &c. So chariots were sacred to the sun at Rhodes, &c. So Cybele (the earth) is represented as carried in a chariot, drawn by lions; because, as Servius upon Virgil

gill assigns the reason, the earth hangs pendulous in the air, so Jupiter has his winged car.

There is abundant proofs that the heathens knew that there was a central fire; they called it *Attis*, or *Ate*, as they fancied it male or female; and this deity in Phrygia, they joined with the great mother of their gods *Cybele*, which is drawn in a chariot by lions, animals which abound with impetuosity and fire, which is, as Macrobius says, the nature of the heavens.

The Canaanites had a temple to the giver of heat; and the heathens took each of the streams of light, with its several variations, for a signal of the will of their god the heavens: hence astrology, oracles, divination, &c. to which the Canaanites had a temple under the name of the intelligencer of signs. To the central fire the heathens built high places, where they made their children pass through the fire. The Zidonians worshipped it under the female title *Asteroth*, which was the Egyptian Venus, or Isis, whom they pictured with cow's horns, as the Greeks did Juno.

The

The light receding, was a grand object of heathen worship, to which the Egyptians had a temple; and the Canaanites had a temple to that action of the spirit, whereby the fire is blown and fed; to this they ascribe the gift of prophecy or inspiration, and made the emblem some sort of cordial fruit.

The heathens were strangely infatuated with the celestial agents, which they thought laboured in their behalf, and therefore called in the operators, and divided them into classes, called celestial, terrestrial, and infernal. They called them celestial gods, for their agony in the atmosphere; to these they consecrated tops of mountains, towers, pyramids:—terrestrial, when their actions reached the surface of the earth, in vegetation, &c. to which they erected low altars of turf, upon the ground, offering corn and other fruits upon them:—infernal, for what they did in the abyss, or bowels of the earth, cracking the strata, or sending forth springs; these they worshipped in caves and cliffs of rocks: hence their sacred fountains, rivers, fishes, minerals, &c.

Having

Having now, I hope, made it evidently appear, that the gentile philosophy was stolen from revelation; and having shewn the analogy between the heathen idolatry, and the philosophy of the scriptures, I shall now proceed to the next head of my discourse, which is to give an account of the different systems of philosophy, that have prevailed in different ages of the world, with a short account of the most eminent philosophers of different ages, and the times when they lived.

In the mean while, I would seriously advise all those that have the care of the education of youth, especially those who read the classics, to make them well acquainted with the nature of the heathen deities, their origin, what they signify, and the reason that first induced the heathens to deify them. This is of the greatest consequence in the education of youth; it will serve to teach them philosophy, while they are learning language, and will greatly contribute to their right understanding the books they read. Those who wish to know more of the matter, may consult the writings of the learned Mr. Hutchinson, &c.

CHAP. VI.

OF THE VARIOUS SYSTEMS OF PHILOSOPHY,
WITH A SHORT ACCOUNT OF THE MOST
EMINENT PHILOSOPHERS OF DIFFERENT
AGES.

WHEN men had lost the knowledge of revelation, whether conveyed by hieroglyphics or letters, each fell to make a system for himself; and then guessing and conjecturing, without either demonstration or evidence, was first honoured with the name of reasoning; and imagination being set at work, and indulged, led mankind into labyrinths of error, which ceased not till it had filled them with self-sufficiency, and the thickest mental darkness; out of which maze there is no clue to guide us, but the infallible records of revelation.

The first amongst the heathens, of great note, who made it their business to instruct others, and thence were dignified with the name σοφοί, sapientes, wise men, were the seven cotemporaries, called the seven wise men of Greece, viz. Thales,
Pittacus,

Pittacus, Bias, Solon, Cleobulus, Periander, and Chilo.

They flourished betwixt the fortieth and seventieth olympiad; and, excepting Thales, were all law-givers in their respective states. The credit of these wise men was much increased by a remarkable instance of modesty, which happened on this occasion.

Some men of Ionia, had a draught of fishes from the Melesian fishermen; when the net was drawn out, there was found a golden *Tripod* of great value, inscribed to the wisest; upon this a dispute arose, whose it should be; but not being able to come to an agreement, they all consented to be determined by the oracle at Delphi. The oracle being consulted, gave for answer, that it should be given to the wisest: the Milesians sent it to Thales; he sent it to Bias; he again sent it to Pittacus; and thus going on through all the seven, at last it came to Solon, who affirming God to be the wisest, consecrated it to Apollo.

The knowledge of the Sophi was communicated in short sentences or apothegms, several of

which are transmitted by antient writers, as
 γυναι. γενεαυτον.

Diogenes Laertius, and Plato, give a full account of these early ages.

After Thales, &c. philosophy became a profession, and was taught by Pythagoras, and Anaximander his disciple: the first was the founder of the Italic, and the last of the Ionic school.

THE PYTHAGOREAN PHILOSOPHY.

The *Pythagorean Philosophy*, so called from Pythagoras, the head of the sect, was confined to natural philosophy, and the solving the phenomena of nature by numbers, and geometrical magnitudes; imitating the Egyptians, who, as we observed before, delivered their learning in hieroglyphics and mysterious characters.

The philosophers of this sect found out the five regular bodies.

1. The *Tetraedron*, which is a solid figure, contained under four equal and equilateral triangles.

2. The

2. The *Hexaedron*, which is a solid figure, contained under six equal squares.

3. The *Octaedron*, which is a solid figure, contained under eight equal and equilateral triangles.

4. The *Dodecaedron*, which is a solid figure, contained under twelve equal, equilateral, and equiangular pentagons.

5. The *Icofaedron*, which is a solid figure, contained under twenty equal and equilateral triangles.

These are the five regular bodies, so called, because they are composed of regular planes; they were afterwards called the Platonic bodies.

The Pythagoreans fancied, that all the particles of matter were originally of one or other of these shapes, having observed so great perfection in them. By this means philosophy became chimerical and romantic; and all the advantage we derive from the Pythagorean philosophy, is, that it accounted geometry and arithmetic indispensibly necessary to the study

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of natural philosophy. They supposed a vacuum, or vast space, beyond this system, for their god to breathe in. They supposed their souls particles of divinity, and made of air, which after a long purgatorial transmigration, returned and mixed with the divinity, as we see in what is called Pythagoras's golden verses :

The soul free'd from the body's dark abode,
Mingles with æther, and becomes a god.

Pythagoras was born at Samos, and was a disciple of Thales; he flourished about the sixtieth Olympiad, and travelled in quest of knowledge through Egypt, Chaldæa, and Phœnicia, and visited the oracles at Delphi, Delos, and Crete; was initiated in all their mysteries, and instructed in all the eastern learning. He left Samos and went to the south of Italy, now called the kingdom of Naples, then called Magna Grecia, and set up a school at Croton about the sixty-second Olympiad.

Pythagoras formed his philosophy upon the Egyptian plan, and imitated his masters in wrapping up his doctrine in symbols and allegories. His scholars were not admitted to the full knowledge of his doctrine till after five years

years silence, and a great variety of preparation and previous trial. He made great improvement in geometry, arithmetic, and music, and applied proportion, number, and harmony to every thing; or, at least, made them his primary symbols. He invented the forty-seventh proposition of Euclid's elements, and is said to have offered a hecatomb upon that account. His modesty was so great as to refuse the appellation of σοφός, and assumed that of φιλόσοφος.

He divided philosophy into critical and practical; the end of the first is truth, and to wonder at nothing; and that of the other virtue, and the liberty of the mind, which he supposed to be confined in the body as in a prison.

To promote the enlargement and disengagement of the soul, he prescribed a very spare diet to his scholars; and forbid the eating of flesh, or killing of animals either for food or sacrifice. His own food was honey, bread, herbs, and water. The directions he gave his scholars every night to look into the actions of the day, are justly celebrated and worthy of imitation.

imitation. He observed so much order, proportion, and design in the universe, that he first gave it the name of *κοσμος*. Though he wrote several books, yet they are all lost. His golden verses contain the substance of his doctrine; they were not however wrote by himself, but as some will have it by Ephthamos or Epe-
docles. The particulars of Pythagoras's life and doctrines are recorded by Diogenes Laertius, and Jamblichus, who professedly wrote, but have mentioned a great many ridiculous legendary stories of him.

Of the Italic school were Archytas, Tarentinus, Ocellus, Lucanus, Epicharmos, Epe-
docles, Parmenides, Locrus, Hierocles, and a great many more.

In the Ionic school Thales succeeded Alexander a Milesian, who invented the art of dial-
ing and the obliquity of the zodiac, and first discovered the equinoxes. To him succeeded Anaximenes, who maintained that air was the first principle of things. After him came Anax-
agoras, who, born to a great fortune, left all to apply himself to philosophy. In the first year of the seventy-first Olympiad, being then in
his

his twentieth year, he went to Athens, where he remained forty years, and for his great wisdom obtained the title of *σοφιστής*; in the eighty-second olympiad he was banished from Athens, and returning to Lampsacum, there spent the remainder of his days. He had Archelaus, and the famous Athenian philosopher Socrates, for his scholars.

The intention of the Ionic school had been hitherto wholly set upon natural philosophy or physics, in which they had made but very little progress, for a reason which we shall afterwards mention. It was Socrates who propagated learning, and is therefore stiled the father of true philosophy.

Socrates was born at Athens in the seventy-eighth year of the Olympiad: his father Sophroniscus was a statuary, his mother Pharanita, a midwife. He, for some time, followed his father's profession, but soon discovered such a genius for learning, that Crito, a rich Athenian, took him from the shop, and gave him a proper education.

Having observed how little philosophy was in repute in life, he recalled it, as Cicero expresses

presses it, from those hidden and obscure subjects, about which his predecessors had busied themselves, and brought it into common life, to inquire into virtue and vice, good and evil. Hence he is said to have brought down philosophy from the heavens, and to have introduced it into cities and houses. Man was the subject of his philosophy, and the great end of his doctrine was to make mankind wiser and better, by inculcating the duties of religion and virtue.

His method of teaching was by asking questions, beginning at the most simple, and proceeding, on the answer given, to others of a higher nature; he himself, all the while, affirming nothing. This method of his was founded on a belief of the pre-existence of souls, whose former knowledge, after its union with the body, was to be brought again by instruction. Hence he humourously said, his art had some affinity to his mother's; for though barren himself, he assisted in bringing forth what mankind had within them.

His modesty was so great, that he said he knew nothing, and was for that saying honoured

ed with the title of *σοφιστής*, by the oracle of Apollo. We are not however to conclude from this that Socrates was a sceptic; he only seems to have had a just sense of his own weakness, and narrowness of the human understanding. He avoided determining, in speculative points, and reckoned it the proper end of philosophy, to press with proper inducements the practice of virtue. He saw through many of the absurdities of the popular religion or idolatry, and threw off the rubbish of heathenish superstition from several divine truths. He taught that God made and governs the world by his providence, and knows all things. He taught the immortality of the soul, and supported that doctrine by a variety of arguments; and besides this he inculcated the doctrine of a future state of rewards for the good, and punishments for the wicked. In a word, he revived so much true philosophy, that he seems to have been the first since the general apostacy to idolatry, that had any just notions at all of the nature of man and his duty. He opposed the sophists for pretending to wisdom, and exposed them in his discourses, which made them contrive, and, at length, accomplish his ruin.

Aristophanes,

Aristophanes, a comedian, at their instigation, introduced him on the stage in a basket, and made him appear ridiculous and odious to the people; at last they accused him to the senate for despising the gods, yet the country believed he was introducing new ones, and corrupted the people by his philosophy. To the eternal reproach of his judges he was condemned to death. The day before his death he reasoned with his friends about the immortality of the soul, and expressed a particular pleasure in the hopes of meeting with Homer, Hesiod, and some other great men that died before him. In the evening the executioner brought him a cup of poison, which he cheerfully drank off, and soon after expired in the first year of the ninetieth Olympiad. The Athenians put to death his accusers. It is generally thought that he wrote nothing.

Xenophon and Plato, both his scholars, give a full account of his life and philosophy. In the memorable things of Socrates, wrote by Xenophon, we have the best account of his reasonings; for Plato in his dialogues intermixed a great many things of his own, which Socrates never taught. Xenophon, Plato, Æschines,

chines, Euclid of Magara, Cebes, &c. were his scholars; and Xenophon and Æschines, both Athenians, were his particular favourites, and committed his dialogues to writing, and some of them have come down to our time.

Xenophon was son to one Gullus, and was born about the eighty-second Olympiad, and was in the Peloponesian war along with Socrates, and ever after followed a military life. He attended Cyrus the younger in his famous expedition into Asia against Artaxerxes, and is remarkable for conducting the extraordinary retreat of the seven thousand Greeks after Cyrus's defeat. He died at Corinth about the hundred and fifth Olympiad. He was a very fine gentleman, besides a fine scholar, and his books are reckoned amongst the purest Greek classics, and read at schools and universities.

Cebes of Thales, another disciple of Socrates, wrote several dialogues, one only of which, the *Tabulature*, has escaped the injury of the times.

Aristippus of Cyrene, a scholar of Socrates, but widely differing from the doctrine and practice
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of his master, founded the Cyrenic school; he entirely rejected the law of nature, and said that justice and honesty were only institutions of men; he made pleasure the ultimate end of all our actions, and virtue had no place in this system, farther than it was requisite to produce pleasure.

The Megari applied themselves to the study of logic, and thence were called logicians or dialectics.

Antisthenes, another scholar of Socrates, founded the sect of the Cynics, and had the famous Diogenes for his scholar. They had learned from Socrates that morality was the most useful of all sciences, and from that they absurdly concluded that all other sciences were to be despised. Their fundamental principle was to live according to virtue, which was sufficient to make men happy. They looked upon liberty and indecency as the greatest good. The gods, they said, stood in need of nothing, and they, who want the fewest things, resemble them most. To procure this happy independency, they looked upon riches and honour with indifference; and renounced all the conveniences

veniences of life. Diogenes would have no other habitation than a tub, and cup, and when he found he could drink out of the hollow of his hand, he threw away his wooden cup as a superfluity. Alexander the Great came to visit him in his tub, and asked him, what he desired of him, for that he was ready to serve him in any thing? Nothing, replied Diogenes, do I desire of you, only don't take away from me what you can't give, meaning the light of the sun.

The Cynics, on pretence of following nature and independency, observed no decency, and looked upon all the world with contempt.

Plato, of all the scholars of Socrates, made the greatest figure; he was born at Athens in the eighty-eighth Olympiad. After continuing some time with Socrates, he travelled into Egypt and Italy, and returning to Athens, he taught philosophy in the academy, a gymnasium, or place of exercise, in the suburbs of the city, beset with wood, whence his followers got the name of academics. The philosophy which he taught, was a composition of the Socratic and Platonic doctrine, and was of three kinds, ethics,

ethics, physics, and dialectics. He did not join with the Pythagoreans in the supposed vacuum, beyond this system, for their gods to breathe in. He taught that the sphere of universal nature enfolds every thing within its circular embrace, endeavours to mix with itself, lays a stress upon the whole, and suffers no place to be void of matter. Plato, in his travels, seems to have learned some tolerable notion of the spherical or orbicular shape of the earth; for in his *Timæus* he asserts that the world must be *σφαῖρον*, upon which figure he bestows the encomiums of *το ὀρεπρον*, most becoming; *συγγενες*, congenial; therefore he argues that it is *πεπερασμένον*, a *sub finibus exactus*, of a limited extent. He retained an idea of the threefold state of the air, as is evident in his *Timæus*, where he says, "The air burnt is fire, fire extinguished and concreted returns to air, air becoming still grosser constitutes clouds or darkness." And Hippocrates de flatibus, says, that spirit is the pabulum of fire, and that fire deprived of spirit or air cannot live. Plato likewise knew the properties of the load-stone, and calls it a divine force. Some have foolishly and ignorantly imagined that the Jews did not know the use of the loadstone; but without the help of the magnet,

magnet, how could they have failed to the land of Dust, or the Dust Coast?

The knowledge of the Platonic philosophy is to be found in the writings of its author Plato, which are held in great esteem. He wrote in the way of dialogue, and for the most part makes Socrates one of the speakers. His books of the republic and laws, shew him to have applied much to the study of politics.

Archefilaus, one of Plato's successors, founded the middle academy, about the 107th olympiad. His philosophy consisted in making a doubt of every thing, and arguing for and against all manner of questions. He went a great deal further than Socrates, and said that he could not be sure even of this, that he knew nothing.

Carneades afterwards softened the Sceptics a little, and said, that though there were no truth, which did not admit of some doubt, yet there were such degrees of probability as were sufficient to determine a private man. This was the new or third academy. Carneades was sent from Athens along with Diogenes the

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stoic,

Stoic, and Cutolaus the peripatetic, on an embassy to Rome, about the year of the city 599. He and the other two taught in different parts of the city, and were resorted to by the Roman youths, which made old Cato, the censor, to move the senate, to dispatch them as soon as possible, lest the youth should be drawn from the military art to the study of philosophy. About this time Aristotle, the most famous of all Plato's scholars, formed his philosophy, which was the second system of philosophy, called the Peripatetic philosophy.

THE PERIPATETIC PHILOSOPHY.

The next sect of philosophers in Greece, was the Peripatetics, or followers of Aristotle; called Peripatetics, because they generally studied when walking about.

This sect resolved all bodies into four elements, (called to this day elementary bodies) viz. *fire, air, water, and earth*, but the chief efficient cause of all was fire. They maintained that the world was from eternity as we now see it. In explaining the phenomena of nature, they had recourse to hypotheses and occult qualities.

lities. Then if one asked what was the cause of digestion? they would answer, that it was owing to the digestive faculty. If it was asked, what was the reason that the loadstone attracted steel? they would answer, that it was owing to the magnetic attraction. By this means philosophy furnished men with names to things, but did not make them one jot wiser. The principles of the peripatetic philosophy, may be gathered from the writings of their founder Aristotle, and are well explained by Cicero, so far as they differ from the stoics.

Aristotle was born at Stagira, a sea-port town of Macedonia, in the first year of the 99th olympiad, A. U. C. 370. When he was 17 years old, he came to Athens, and became a favourite disciple of Plato, in the fourth year of the 108th olympiad. At the request of Philip, he went into Macedonia, and taught Alexander the Great, not only politics, but all the other sciences. In the first year of the 100th olympiad, Philip died, and Aristotle returned to Athens, and taught in a place, in the suburbs of the city, built by Pericles, for exercising the soldiers. As he taught, he walked up and down, and he and his scholars got the name of

Peripatetics. He was the first who reduced the scattered precepts of philosophy into a system, and left treatises on logic, metaphysics, physics, and ethics. He wrote likewise on rhetoric, poetry, and natural history, and is universally acknowledged to have had an extraordinary genius. The grand principle of his ethics, is, that every virtue consists of a mean or middle, between two extremes, both of which are vicious. He was succeeded by Theophrastus, Strato, Lycaon, Dordorus, &c. in the Peripatetic school.

THE EPICUREAN PHILOSOPHY.

The third sect of philosophers in Greece, was the Epicureans, of which Epicurus was the founder. He admitted of the four elements of the Peripatetics, but thought they were composed of an infinite number of still smaller particles, which he called atoms; these he said was from eternity, and by their frequent occurrences, did at last meet with those of the same nature with them, and these being joined, formed themselves into different orders and combinations, in which we now see them, without the interposition of an intelligent agent.

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This is a more ridiculous fancy than that of Amphion's causing the stones to form themselves into the city of Thebes. This system was too absurd to continue long.

Epicurus was born in the third year of the 109th olympiad, and began very early to read philosophy, particularly the writings of Democritus, from whence he chiefly took his physics. Having purchased a pleasant garden at Athens, he lived there with his friends and disciples, and taught philosophy. Though he taught that the world was made by a fortuitous concourse of atoms, without the interposition of any intelligent being, yet he allowed the existence of the gods, and said, that they took no concern of the world, but lived at ease and quiet at a great distance. Thus he subverted the foundation of all religion, and affirmed that pleasure was the end of all our actions, and the chief good, and that virtue was to be followed no farther than as it was a mean of pleasure. But they are greatly mistaken who think that Epicurus gave himself up to all manner of debauchery; on the contrary, he recommended temperance, and other virtues, as conducive to happiness. Yet some of his followers made a very bad use of his

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doctrine,

doctrine, indulging themselves in the grossest enjoyments, and had no notion of moral happiness. The school in the garden was continued till the time of Augustus, under the successive management of Hermaceus, Colylstratus, Dionysius, Basilides, &c.

Epicurus died in the second year of the 127th olympiad. We have a large account of his doctrines in Diogenes, Laertius, Cicero, &c.

THE STOIC PHILOSOPHY.

This philosophy went directly contrary to the principles of Epicurus.

The most considerable part of this philosophy, was, that virtue was the only good; and vice the only evil; that pleasure was no good, nor pain evil; that the passions were preternatural perturbations of the mind, and were to be rooted out; that men were not born for themselves, but for their country and society; and that the whole of man's duty was to live according to nature. But both Zeno, the founder of this philosophy, and Epicurus, seemed mistaken in their notions of human nature: they did

did not consider the whole of it. For Epicurus conceived man to be a sensible being, capable only of pleasure; whereas he took notice only of the mortal part of his constitution: but the Peripatetics seem to have had a juster notion of the matter; for they considered man as capable both of moral and natural good, as a sensible and moral being. They again maintained that the passions were imprinted for valuable purposes, and therefore were not to be rooted out, but governed by reason.

The Stoics imagined the world or universe to be an animal, whereof God was the soul; they also maintained a fate, to which the gods and men were subject; they cultivated dialectics, but made very little progress in physics.

Zeno, the founder of this sect, was scholar to Crato the Cynic. He set up his school in the porchiliston, or painted walk at Athens; hence his disciples got the name of Stoics. He was succeeded in the stoic school by Cleanthus, Chrysippus, Diogenes, Antipater, Parrisius, &c. Among the Greek philosophers of note, were Parmenides, Leusippus, Democrates, and Heraclitus; all of whom, especially the two last,

improved the composition of philosophy or physics, which Epicurus perfected, and made men wise and happy. He was a person of great reputation for learning and wisdom, and a person of great reputation for his being able to right or wrong.

THE SCEPTIC OR PYRRHONIC PHILOSOPHY.

The professors of this philosophy doubted of all things, reckoned nothing certain, and affirmed, that nothing was to be understood or comprehended.

Pyrrho, contemporary with Aristotle, having the books of Democritus, gave rise to this sect, and as absurd as his principles were, he had his admirers and followers.

THE ELIATIC PHILOSOPHY.

Those who embraced this philosophy, espoused none of the foregoing systems in the gross, but collected from each such doctrines as appeared most reasonable; for they wisely judged, that among the variety of different sects, there was much truth and much error; and each system, according to them, was neither true nor wholly false. Every man judged for himself, and allowed others the same liberty.

The great end of philosophy, which was to make men wise and happy, was wholly neglected, and a person's reputation for learning depended upon his being able, right or wrong, to maintain a dispute on a variety of subtile and sophistical arguments. But if one happened in the debate to bear hard upon the system, he was immediately knocked down with a metaphysical quibble, by the authority of Aristotle, or some other of the doctors. Nay so great was the humour of disputing, which the elia-tic philosophy introduced, that even not many centuries ago, it was customary for men of learning to travel about through the different universities, giving challenges to dispute with others, and thrice happy was the sage that came off victorious in the combat. All this while the nature and relations of things were not observed, and the fountain of true philosophy was neglected. Their philosophy consisted in a set of opinions, borrowed at second hand, and received without examination; he was then the most learned man who maintained the greatest absurdities, and supported them with the greatest art and sophistry.

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This philosophy did infinite mischief in religion; it introduced that scholastic jargon which over-spread all Europe, to the great detriment of religion and morals, and rendered the plain and intelligible doctrines of revelation obscure, mysterious, and intricate, and buried all the christian world for several centuries in darkness and ignorance; the effects of which are still to be felt. But thanks to God, the clergy now apply themselves to the study of more solid truths, and neglect the old scholastic sophistry; which is only retained by that turbulent and seditious people the Jesuits, who are the true eliacs of this age, and the pests of human society.

The apostate Jews and heretic and apostate Christians, were no useless assistants to the idolatrous heathens in adding to the bulk of their trumpery systems. They imposed upon themselves, and threw darkness over the scriptures, and thereby fell into errors in philosophy, in order to indulge and countenance their own pride, and not suffer themselves to see the prophecies fulfilled in our Saviour. The plain words of Philo-Judæus shew his apostacy to heathenism. "God, says he, fills all things, leaving

leaving nothing void of himself. The jewish apostacy consisted in turning all the types into ipsa corpora, referring the merit to the typical blood of bulls and goats, presuming for atonement from their own typical services, losing sight of the spiritual, and vainly hoping for a temporal deliverer. Their confined imagination suggested, that the intire sacred apparatus, the miracles, institutions, and prophecies, were only for them; but they had abundant reason to know that the whole human race was no less concerned than they to grasp at the promised good things.

The jewish christian apostates, and many of the most eminent jews at our Saviour's coming, and soon after, either became atheists as Josephus, or turned idolaters, and espoused some one or other of the foregoing systems, as their inclination directed them: this was the case of the learned Philo; and pride was the cause of all this.

Philo understood by his Deus the soul of the world, who fills all things and places with his presence, *non esse extra universam rerum naturam*; who is never angry, and has no passions.

Hence

Hence we must presume, that as he can neither
 love, nor dislike us, we may act without any
 fear of his animadversion. He speaks of two
 potentates under his Deus (the corrupt and idola-
 trous remains of the revelation of the trinity)
 whom he calls his shadows, ministers, or attend-
 ants on his will. He affirms, that heaven is
 infinite; *caelum figura est candelabrum*. And
 when the title of God is given in scripture to
 his angelic potentates, it is only abusive; and
 he takes the liberty *a quasi*, or *in loco*, to make
 the inspired words sense. Of the three, who
 appeared to Abraham, he places his Deus in the
 middle, and the other two most antient and next
 to him in power, on either side, then says, that the
 one is termed God the creator, the other Lord
 the king, because God made use of the former
 in creating the world, and in acts of benefi-
 cence, and of the latter, as a mediator, chief
 priest, and governor amongst them. He will
 not let the heavens be the archetype, but ex-
 patiates upon an intellectual creation, prior to
 the material one, wherein his Deus made two
 ideal examplars of the light and of the spirit,
 of both which we have material resemblances,
ipse vero nullæ creaturæ similis. His concessions
 as to the *Logos*, or word, are all manifestly designed

to evade the main points in revelation. What
 " is more, refugent, says he, than the word of
 " God, by the participation whereof other
 " things shake off their gloom and darkness,
 " and aspire after the light of souls. This word
 " is represented as the physician of our diseases,
 " for even as the rising sun enlightens our
 " earth, so the divine light illuminates the soul.
 " He is superior to the universal world, more
 " antient than all creatures, being God's eldest
 " and first begotten son, his great viceroy over
 " the sacred flock, a medium or umpire be-
 " tween the supreme maker and his creatures,
 " suggesting precepts of good from him, and
 " becoming a suppliant for them." So of the
 Spirit, " That it is not air in motion, but flowing
 from the fountain of reason, a certain charac-
 ter and image of the divine power, and signi-
 fies that pure and unmixed knowledge, of
 which every wise man is deservedly a partaker,
 and wherewith, his soul is inspired."

Besides these, he has so many *corps de reserve*
 of supernumery beings, hierarchys of angels,
 whom he is at no small pains to muster, rank
 and file, and to constitute their commanders:
 they, he says, keep a strict discipline and never
 desert, and their employment is to be victors

or

or executioners, though sometimes they assume the office of intercessors.

The figures of the cherubim were, in many places of the tabernacle and temple, extant to public view, so that all might keep in mind the mystery of the trinity, and of the man joined to him, whom the lion represented. Philo here makes strange work, has indulged his allegorical genius even to madness, talking of archetypes, exemplars, intellectual models, created before the essence of matter: transforms the typical high-priest into a real perfect one, who was allowed entrance into the sanctum sanctorum, only to contemplate the beautiful ideas of virtue, and that the whole garment he wore was a symbol of the strength and incorruptibility of true worshippers.

We find two modern authors copying this apostate (one of them Spencer de Legibus Hæbræorum) where they constitute Cherub, the powerful and great one; adding, that Philo confirms this construction, who delivers it as his opinion (*haud dubie Hæbræorum disciplina*) that the Cherubim represent the two persons of the essence, the formative and the regal; and that the mercy-seat was the symbol of the
merci-

merciful power of God ; therefore, say they, we have reason to believe the word Cherub, had amongst the more ancient Hebrews, the signification of power.

Thus we have an example of gentile philosophy, Judaism, christianity, and hereticism, all united in one man ; and many more examples of the like kind might be produced.

When men were weary of the Epicurean philosophy, they reverted to the principles of Aristotle, which the school-men and christian fathers too much espoused, and found it very difficult entirely to divest themselves of gentile philosophy, to make room for the divine philosophy of the scriptures. The Peripatetic philosophy prevailed for a considerable time ; but when men found that they were not made the wiser by it, those that had not a just notion of the inestimable value of the scriptures, set themselves about forming and devising new systems.

THE CARTESIAN PHILOSOPHY.

This philosophy is called the Cartesian philosophy, from Des Cartes, its author and founder. It teaches, that the universe was entirely
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full of uniform matter, composed of small angular particles, and divisible into innumerable parts, each of which had a two-fold motion, the one a rotation about its own axis, and the other about the center of a common vortex.

From hence he supposeth ;

1. That all the matter of which the universe is composed, was at first divided into equal particles of different sizes, and that they had all such a motion as is now found in the world.

2. That all these particles were not at first spherical, because many such little globes joined together, will not fill up a continued space, but that of whatever figure they were at first, they would by continual motion become spherical, because they would have various circular motions, for seeing that at first they were moved with so great force, that one particle would be disjoined from the other, the same force continuing would serve to cut off all angles, which are supposed in them, by their frequent occurrences against each other, and so when the angles were cut off, they would become spherical.

3. He

He supposeth that no space is left empty; when these particles being joined, leave some intervals between them, there are some more subtile particles of matter, which are ready to fill up these void spaces, which arise from these angles, which were cut off from the other particles to make them spherical, which fragments of particles are so little, and acquire thereby such a celerity of motion, that by the force of that they will be divided into innumerable little fragments, and so will fill up all those spaces which other particles could not enter in at.

4. That these particles, which fill up the intervals between the spherical ones, have not all of them the same celerity of motion, because some of them are more undivided than others are; which filled up the space between the globular particles, when their angles were cut off, and therefore those particles must necessarily have very angular figures, which are unfit for motion; and thence it comes to pass, that such particles easily stick together, and transfer the greatest part of the motion upon those other particles which are less, and therefore have swifter motion; and because these particles are to pass through such triangular spaces, which

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lie in the midst of the globular particles, touching each other, therefore he supposeth them, as to their breadth and depth, to be of a triangular figure; but because these particles are somewhat long, and the globular particles through which they pass with so swift motion, have their rotation about the poles of the heavens, thence he supposes that these triangular particles come to be wreathed. Now from these things being thus supposed, Des Cartes has ingenuously and consistently with his principles, undertaken to give an account of the most noted phænomena of the world, and these three sorts of particles mentioned, he makes to be his three elements.

The first is that subtile matter which was supposed to arise from the concussion and collision of the greater particles, whereby their angles were cut and broke off, and they reduced to a very fine small powder, which Des Cartes called *materia prima*, *materia subtilis*, or fixed element: of this, he said, the sun and fixed stars were composed.

Again. Those of them that had not their angular parts, or points, intirely broke off, composed

posed the atmosphere; and this he called *materia secunda*, or second element; and those whose angular points were not broken off at all, formed the earth, and other planets and comets, and this he called *materia tertia*, or third element. From these three elements, and by the help of these common affections of matter, he undertakes to give an account of the phænomena of the world. He said, in order to arrive at truth, we must doubt of every thing, except our own existence; *cogito, ergo sum*, was alone the first principle, or self-evident truth, according to this system. He maintained innate ideas, and founded the proof of a God on the idea of a perfect Being. He said it was presumption in him to pretend to discover the final causes in the works of God. Brutes, according to him, are pieces of mechanism, mere machines, like a clock, and by motion in the animal spirits he solved all their actions. His physics were chimerical, having no foundation either in experiment or reason. The modern heathens, who lost the notion of the mechanism of the air, supposed it innate. Des Cartes, who was in their condition, mistook its circulation for so many whirling vortexes, and said it was imprinted in his fluid.

This philosophy was, for some time, taught in a great many universities, but, being intirely built upon the fiction of the brain, is now quite expelled; parts, however, of his philosophy are still espoused by some private persons, particularly his doctrine of brutes, and some, even yet, are ignorant enough to believe that there are innate ideas.

Des Cartes, the founder of this philosophy, was a Frenchman, and by all esteemed a very great mathematician, and surely was a man of ingenuity. He founded his philosophy towards the end of the sixteenth century. Though this philosophy tends too much to encourage atheism, yet the author of it was so far from being of that opinion, that he made it his great business to assert the existence of a Deity, and the immortality of the soul.

All these forementioned systems, even upon chimerical suppositions and hypotheses, without examining the nature of things, or going to the fountain of light, it might appear difficult to conceive, if I had not already accounted for it, how there should be so prodigious a variety of sentiments and sects amongst philosophers, seeing truth is one invariable thing. But in order to explain this seeming difficulty,

difficulty, we need only to consider, that to the attainment of every end, certain means must be used; and that if they be not used at all, or be misapplied, success can never be expected. Now there is a true, proper, natural road to knowledge, as well as to every other attainment, which, if neglected, will occasion error and contradiction: this most evidently appeared in the foregoing systems, the founders of which had most notoriously mistaken the road; their various errors and absurdities arose, first, from their apostacy from revelation; and, secondly, from their ambition to be founders of new systems; and as it was a prevailing opinion amongst them, that philosophy is good for nothing, if it leaves any thing in the dark, so they laid aside one system for another.

This uncertain and fluctuating state of philosophy was discovered with concern by the great Lord Bacon, Mr. Boyle, Sir Isaac Newton, &c. they therefore set to work to form a new philosophy.

As the foregoing systems of philosophy are destructive of the christian religion, the reader, I hope, will excuse me, if I, as a christian, make a few remarks upon them, before I proceed to the Newtonian philosophy.

150 VARIOUS SYSTEMS OF PHILOSOPHY,

The several hypotheses, which have been embraced in the different ages of the world, till Sir Isaac Newton's time, may be briefly reduced to these four :

1. Such as suppose the world to have existed from all eternity as it now is.

2. Such as attribute the formation of the world, as it is, to God, but at the same time assert the pre-existence and eternity of matter.

3. Such as deny eternity to the world, but assert its origin to have arisen from the casual concurrence of atoms, &c.

4. Such as endeavour to explain the origin of the universe, and all the appearances of nature, merely by the mechanical laws of the motions of matter.

I shall begin with those that assert the eternity of the world as it now is; amongst whom Aristotle hath borne the greatest name; but neither he nor our modern Platonists have any other arguments, than the few following false suppositions.

1. That

1. That it is inconceivable that things should ever have been in any other state than they now are.

2. That there is no other way of production than by generation. And,

3. That God is no free agent, but produced the world by necessity of nature.

They say, it is inconceivable that things should have been in any other state than what they now are. The rise of this supposition was, because all the conclusions of reason, upon which they proceeded in this philosophy, were taken from things, as they are at present in the world; from hence arose that strong presumption amongst men, *nihil ex nihilo fit*, which hath been so taken for granted, as to be looked upon as a common notion.

I grant that nothing could ever bring itself out of non-existence into being. For it is certain that every thing was not made, but that there is something necessarily self-existent; otherwise, if every thing had been made, then something of necessity must have been made out of nothing, which is impossible, and may be proved thus:

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Of two contradictions, one is necessarily true; therefore every thing had a beginning, or had no beginning; every thing is bounded, or not bounded; limited, or not limited. Again, every thing that is an effect necessarily pre-supposes an efficient cause, anterior and antecedent to any efficient cause whatsoever: therefore there necessarily is a cause, which was the first cause, and which could not possibly be from, proceed, or depend upon any antecedent cause. Lastly, every thing that is produced doth necessarily imply a producter; therefore of necessity there must be a producter antecedent to any production whatsoever. Therefore there is something which necessarily is eternal. If this is denied, we run ourselves into the absurdity of saying, that a thing must have acted before it was, or existed, which is impossible. It is certain then that every thing was not made, but something existed of itself from all eternity.

Now as something existed of itself from all eternity, one may naturally ask what that something was, whether it was a perfect Being or God, or the most imperfect of all things whatsoever, inanimate and senseless matter? To this I answer, that it was the most perfect Being or
 God

God, that existed from all eternity; which is proved thus:

It is undeniably evident, that lesser perfection may come from greater; and utterly impossible, that greater perfection should arise from lesser, since no effect can possibly transcend the power of its cause. Therefore an imperfect being cannot be the foundation of all things.

Again, we know we have a faculty within us that thinks, called mind; whether was it made or not out of senseless matter? It is certainly true, that if there had been no life in the universe, but all had been dead, then there never could have been any life, and if once there had been no mind, understanding, or knowledge, then there never could have been any mind or understanding produced. For to suppose it to spring out of that which is altogether dead and senseless, is plainly to suppose something to come out of nothing. From whence I infer, seeing there is a mind, we are certain there was some mind from eternity.

But the use the heathen philosophers made of the maxim, *nihil ex nihilo fit*, was from hence,

to

to conclude, that God could not create any new *entity* out of nothing, but only out of pre-existent unmade matter, as a carpenter does a ship; that though the world was, says they, made by God, yet the substance or matter, out of which it was made, certainly was not made. The seeming plausibility of this argument chiefly arises from these following reasons; from the confusion of their own conceptions; for, seeing it is certain, that nothing can possibly be made out of nothing, in one sense, viz. casually; from not distinguishing senses, and not being aware of the equivocation that is in this, out of nothing: and lastly, from unskillfully arguing from artificial things; because, nothing can be artificially made without pre-existing matter, as a house cannot be built without materials.

But since it is certain, that imperfect beings can, of themselves, produce something out of nothing pre-existing, as new thought, new local motion, it is highly reasonable to think that an absolutely perfect being could do something more, that is, create new substances out of nothing, or give them their first being and existence. And it may well be thought as easy for God, or an omnipotent being, to make a whole world, matter and all, out of nothing,

as it is for us to create one thought, or to move one finger.

Again, If the world be produced, say they, it must have been thus and thus, and it is impossible it should have been so. Why? Because we see things are otherwise now in the world. How infirm a way of reasoning this is, will appear by the following simile of Naimonides. " Suppose, saith he, one of excellent
 " parts loses his mother immediately after he
 " comes into the world, and his father brings
 " him up in an island where he has no society
 " with mankind till he comes to the years of
 " understanding, and never saw any female of
 " the human or brute creation; suppose now
 " this person enquires of the first man he sees,
 " how men are born and come into the
 " world; the other tells him that every man
 " is bred in the womb of one of the same
 " kind with ourselves, thus and thus formed;
 " that while we are in the womb we have a
 " very little body, and there move and are
 " nourished, and we grow up by little and
 " little, till we come to such a bigness, and
 " then we come forth into the world, and still
 " continue to grow, till we come to the pro-
 " portion we now are of. Here this young
 " man

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“ man presently stops him, and enquires, when
“ we were thus little in the womb, and did live,
“ move, and grow, did we not eat, drink, and
“ breathe at our mouth and nostrils as we now
“ do? Did we not ease nature as we do now?
“ If it be answered, no, then he is presently
“ ready to deny it, and offers to bring demon-
“ stration, that it is utterly impossible it should
“ be so; for, saith he, if either of us cease to
“ breathe only for an hour, our motion and life
“ are gone. How is it possible for any one of
“ us, though never so little, to live and move
“ in the womb, for so many months, when
“ it is so close and shut up, and in the middle
“ of the body? If one of us, saith he, should
“ swallow a little bird, it will presently die, as
“ soon as it came into the stomach, how much
“ more if it were in the belly? If we were
“ but a few days without eating and drinking,
“ we should not live, how can a child then
“ continue so many months without meat and
“ drink?

“ Again, if one should eat and drink with-
“ out voiding the excrements of what he does
“ eat and drink, he would certainly die, how
“ then can a child live? If it be answered,
“ that

“ that there is a passage open in the belly at
 “ which the child receives its nourishment, he
 “ presently says, that is as impossible as the
 “ other; for if our bodies were so open, we
 “ should be quickly destroyed. And again,
 “ if the child had all his limbs perfect and
 “ found, how comes it not to open its eyes,
 “ use its hands and feet, as we do?

“ Upon the whole, he positively concludes,
 “ that it is impossible that men should ever be
 “ born after this manner.”

I now come to the second false hypothesis,
 upon which the opinion of the world's eternity
 was founded, viz. that there is no other way
 of production but by generation.

Most of the arguments used by Aristotle
 against the production of the world, run upon
 this supposition, that it must be generated as
 we see things in the world now are. For, says
 he, if the first matter were generated it must
 be generated of other matter, and so on ad in-
 finitum: but all his arguments prove no more
 than this, that the world was not generated as
 plants and animals are; but who in his wits
 ever asserted that? Do any of these argu-
 ments

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ments prove it impossible, that God, having infinite power, should produce the universe in another way than any of those things which we observe in the world are produced? We assert an infinite and eternal Being was the efficient cause of the world, who by his omnipotent power produced it out of nothing, and still continues it in being.

The third false hypothesis they went upon was, that the being of the world was no effect of God's will, but proceeded from the necessity of nature. For the proof thereof they argue thus; God cannot be himself without his goodness, and if his goodness cannot be without some creature to shew or display it upon, God cannot be without his creature, because they are necessary issues of his goodness. Consequently, by this way of reasoning, the being of the creatures becomes necessary to the being of a God, which is the highest derogation from the absolute perfection of the Divine Being. But we assert, that the goodness of God is so great, that nothing can be greater, and that it was the communication of his divine goodness that gave being to the world; but we at the same time acknowledge God to be

be an agent infinitely wise and free, who dispenseth his goodness in such a way and manner, as is best pleasing to himself, though at the same time always agreeable to his nature. But if the world did of necessity exist, then God is no free agent, and if so, then all instituted religion is to no purpose; so much is it our concern to enquire into the true origin of the world.

I now come to the Atomical, or Epicurean philosophy, which, upon due consideration, will appear as irrational as the fore-going. By this system, the history of the creation quite falls to the ground, upon which account we are more particularly to consider the reason of it, for by this opinion we have nothing but a rendezvous of atoms and infinite space, in which, after many encounters and facings about, they fell into their several troops, and formed that regular battalion the world.

The Epicurean hypothesis supposes, that there was an infinite number of atoms, which by their frequent occurrences, did at last meet with the same nature with themselves; and these being joined together, make up the bodies we now see. But this system of philosophy I shall make appear to be precarious and built upon

upon no sufficient grounds of reason, and that it cannot give any satisfactory account of the origin of things.

First, then, that they could have no evidence of the truth of it, I prove from those criteria which Epicurus lays down as the only certain rules whereby to judge of the truth of things; viz. sense, and anticipation. Let me ask them, what there is evident to sense, which proves a fortuitous concurrence of atoms for the production of things? Nay, though we grant that the compositions of bodies is nothing but the contexture of these insensible particles; yet this is far from being any evidence to sense, that these particles, without a wise and directing providence, should make up such bodies as we now see in the world. We may ask Epicurus's followers, if ever they found a poem composed by the casual throwing together of letters; it is as impossible for one to suppose a number of letters casually thrown together should reach the grand stile of Virgil or Homer, as to believe that the fortuitous concurrence of atoms made up this universe.

We shall be able to afford as little relief to this system from the second criterion; viz. anticipation

icipation. For by Epicurus's own acknowledgment, all anticipation depends on the senses, one of these four ways: 1. By incurfion. 2. By proportion. 3. By fimilitude. 4. By composition.

First, then, there can be no incurfion of infenfible particles, as fuch, upon our senses: we may indeed by proportion imagine the parvitude of them, but that's nothing. Similitude can do no good, for neither Epicurus, nor any of his followers, ever saw a world fo made. The only relief must be from composition, and that will prove the origin of the world, from the fortuitous concourse of atoms, to be as true, as that the watches we carry in our pockets made themselves. Now let any one judge, by these criteria, laid down by Epicurus, whether the hypothesis of the origin of the world by atoms, can possibly be true.

Again, The way they took to prove the origin of the world, which was by proving that all bodies are composed of such insensibile particles, is false. For granting the thing itself, that all bodies are made up of insensibile particles, I deny the conclusion. Though the composition of
M bodies

bodies arise from the contexture of atoms, does it therefore follow, that these particles did casually produce these bodies?

It would answer no purpose, but that of spending of time, for me to insist upon every particular of this hypothesis, as it appears most ridiculous to an intelligent understanding.

I come now to the last sect of philosophers, who undertake to give an account of the origin of the universe, from the mechanical laws of motion and matter; which was the hypothesis of the late French philosopher Des Cartes. Though there be no reason to believe that he intended to encourage atheism, making it so much his care to prove, and assert the existence of a deity, and the immortality of the soul, yet because atheistically disposed people are apt to abuse it to that purpose, we shall therefore take a brief view of it.

There are two grand suppositions, upon which this philosophy is founded; viz. the pre-existence of matter, and its motion; which, if we prove false, we subvert the elements of all this philosophy.

If matter be unproduced, then necessary existence belongs to it as to God; and if necessary
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sary existence belongs to matter, infinite power must likewise belong to it, for what necessarily exists, is self-originated; whatever is self-originated could not, by any cause whatever, be hindered from being; and what cannot be hindered from being, must have infinite power; and what has infinite power, may produce any thing, and is God. So matter cannot be a mere passive principle, but must necessarily be active, and must be God himself; otherwise God and matter must be co-equal and co-eternal: if so, then there must of necessity be two gods.

2. It is repugnant to the independence of God; as it makes God subject to matter, and not matter to God. For if God cannot produce any thing without the existent matter, then matter is necessary to his action, and God must depend on that, without which he can do nothing. Thus matter at last has got above the deity.

Again, All bodies persevere in the same state of rest or of motion, unless forced out of that state by some outward impressed violence; that is, all bodies at rest will naturally continue in that state, unless some external cause put them in motion; and all bodies in motion will naturally move forwards for ever, in the same straight line,

unless stopped by some opposite force, or turned out of their course by some differently directed violence. Moreover, there is in matter, according to Sir Isaac Newton, a passive principle, which he calls *vis inertiae*, whereby bodies resist, to the utmost of their force, any change or alteration of their state, whether of rest, motion, or its direction; and this resistance is always equal in the same body; and in different bodies is in proportion to the quantity of matter they contain. There is required as much force to stop a body in motion, as is required to put it in motion, and *è contra*. Since then a body resists a change of its state, this resistance will operate as powerfully to keep a body in motion, as to keep it at rest, and consequently of itself it can never change its state of rest, motion, or direction; for to change its direction, is the same thing as to move of itself another way. Matter then of itself is so far indifferent to motion or rest, that it is no more inclined to the one than to the other and does no less resist a change from rest to motion, than from motion to rest. Hence it is evident, that no particle of matter, nor any combination of particles; that is, no bodies can either move of themselves, nor of themselves alter the direction of their motion. Matter is
not

not possessed of self-motion ; it is merely passive, and must of itself for ever continue in that state.

Now we see this great improver and discoverer of the mathematical powers of matter, must freely confess the necessity not only of God's giving motion to the universe, but of his creating the matter whereof it was made. God hath left the marks and impressions of infinite wisdom and council upon the creation ; the very works themselves shew the author ; for if the great curiosity and contrivance of any artificial engine, speaks the excellency of the framer of it, what ridiculous folly would it be to impute that rare mechanism of the works of nature, to the blind and fortuitous motion of some particles of matter ?

I might desire any one to walk along with me a little while upon the wide theatre of the world, and diligently attend to those many and most manifest marks and signs, that I might point out to him in this outward frame of things, that naturally signify to us that there is a God. The preservation of the being and faculties both of the animate and inanimate part of this system of things, does necessarily require the

power, and consequently the existence, of a being absolutely perfect, that is, of a deity. For since this system of things has not been from all eternity, as we now behold it, and since there is no necessary connection between the being of any one part thereof and another; and since we see both have been preserved for a considerable time, this preservation of the being and faculties of things, can never be accounted for, without having recourse to an Almighty power, which is sufficient for all things, not including a contradiction. But the argument for the existence of a being absolutely perfect, who made and governs this system of things, which of all others is most infallible and demonstrative, and which ought to affect us most, is the testimony God hath given of himself, and the revelation he hath vouchsafed to make to man in the holy scriptures. They are the oracles of unerring truth, 'tis by them we come to know God and his creation, and every other part of useful knowledge.

Prove only the authenticity of the scriptures, then your work is done; for in them we have plainly revealed to us what he has thought proper to make known of his own existence, and the order and manner of the creation.

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The outward face of things carries a strong argument for the existence of a Deity. For it is altogether impossible that this universe could have been better contrived, or more completely furnished than it is, had infinite wisdom first actually designed it, and then put the design in execution. And it is altogether impossible for the united skill of men and angels to mend any part, or contrive it better.

To shew the grandeur, magnificency, and excellency, the usefulness and contrivance of this system of things, is a very large subject, and to treat it according to its dignity, requires far greater abilities than I am master of, and more room than the limits I have prescribed to myself or the plan of this book will admit. And I shall at present dismiss those old worthies, the world-making philosophers, with a proverb;

Nil tam absurdum est quod non dicat aliquis philosophorum.

Let others talk of their mechanical powers, their fortuitous concourse of atoms, &c. to me the footsteps of divine council and providence, in all things, both in heaven above and earth below, appear most visible.

When we look up to the expanse or heavens, there our numbers fail us, and our arithmetic can scarce give us an idea of the vast quantity of systems that adorn this stupendous piece of architecture. Let us only conceive the glorious body of the sun, a huge mass of liquid fire, fixed in the center of our planetary system, and acting as a focus, or center of motion, to all the planetary orbits; for the light, issuing out of the body of the sun, gives motion to the planets, and enables them to perform their course. Nearest this liquid body of boiling fire, is the planet Mercury, which makes his oval course round the sun in eighty-eight days; next to Mercury is our bright and beautiful evening and morning planet Venus, which revolves round the sun in the space of two hundred and twenty-four days and eighteen hours; next to Venus, our earth, with its attendant the moon, perform their friendly course, and measure out the year in the space of three hundred and sixty-five days, six hours, &c. Beyond our earth, Mars takes his stand, and performs his task in one year and three hundred and fifteen days; after him comes Jupiter, the largest of the planets, with his four satellites, and finishes his tedious journey in thirteen years; and last of all Saturn, with

with his five guards, and his surrounding annulus, describe the remotest orbit in the space of thirty years, and conclude our system.

These planets, besides their revolution round the sun, turn round upon their own axis; the earth in one day, the moon in twenty-nine, Jupiter in ten hours, Mars in twenty-four and forty minutes, and Venus in twenty-three hours; and most astronomers think that the sun revolves round his axis in twenty-five days; tho' I think, it is much more probable, that he does not move, but remains a fixed center of motion to all the other planets.

Since the revolutions of the planets about the sun, and their rotation round their own axis, and many more particulars, are the same as in our earth, some think that they may be alike in other things, and that they have an atmosphere, vegetables, fire, water, inhabitants, &c. And, as it is supposed, that our fixed stars are exactly of the same nature with our sun, some have supposed, that they have planets, and that these planets have satellites, and that these planets and satellites have inhabitants; but these are mere conjectures, which I am inclined

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clined to believe, from the history of the creation, to be without foundation. However, without running into these suppositions, what a noble and glorious fabric presents itself to us? What a beautiful scene of things have we here? How simple, and yet how wonderful are the works of nature? Well might the Psalmist say, *The heavens declare the glory of God, and the firmament sheweth his handy work.* How is it possible to believe that such a beautiful system could have been produced by the casual concurrence of atoms?

And if we course over the vallies and mountains, range the woods and forests, sound the depth of the sea, and dig into the innermost parts of the earth, there the omnipotent hand of providence will appear, there the God of nature will speak forth.

THE NEWTONIAN PHILOSOPHY.

This system of philosophy is called the Newtonian philosophy from Sir Isaac Newton, an eminent professor of it.

It was Lord Bacon, chancellor of England in the reign of king James I. who first saw the cloud,

cloud, in which philosophy for many years had been wrapt up: for his penetrating mind so discovered the absurdities and fruitlessness of the philosophy in fashion, and the impossibility of ever arriving at new knowledge by the beaten path of the systematic way, that he laboured all he could to open again, as he expresses it, the commerce between the mind and things, which had been so long interrupted. He well understood that the business of philosophy was not to support imaginary systems, but to observe and explain nature; and hence in two words he gave a more satisfactory account of philosophy than others had done in a hundred volumes, viz. *interpretatio naturæ*; and the philosopher he calls *naturæ interpretes*.

According to this philosophy, the quantities and properties of bodies are discovered by experiments; and indeed, this was a very promising method of attaining knowledge; for it cannot be too often repeated, that there is no real knowledge that is not founded in nature; that knowledge of nature is no other than the knowledge of facts or realities, and their established connections; that no rules or precepts of life can be given, or any schemes of conduct laid down,

down but what suppose an established course of things, carried on in a regular and uniform manner; that in order that those may prove just and successful schemes, the course of things must be understood and observed, and that all philosophy, even the most particular and dialectic parts of it, must be drawn from, or at least resolved in, the observation and knowledge of real existences; or, what is the same, that the knowledge of truth is the knowledge of fact, or the immediate consequences of it; and whatever speculations are reducible to either of these, are true, and whatsoever are not, are chymical and uncertain.

The professors of this philosophy proceeded very cautiously in their enquiries; they did not busy their heads in devising or supporting any system; they brought all things to the test of experiment, and admitted nothing as a truth, till they had found it so by repeated experiments, which is a most rational way: for a person without experiment would never discover many of the most obvious and general properties of matter. Thus, in the case of fire, a person might devise a thousand properties of it, before he could once imagine that it has a power

power of dissolving metals, but experiment immediately finds it out.

This is the philosophy that is generally taught in universities, and there have been, and are, many eminent men that profess it. This method of philosophising was pursued, and very much improved, by Mr. Boyle, as also by Dr. Wilkins, bishop of Chester, who having associated a considerable number of learned men to improve this philosophy, obtained a patent from king Charles II. to form themselves into a society, under the name of the Royal Society.

Francis Lord Bacon, chancellor of England to King James I. was the first, as I said before, who saw through the cloud in which philosophy was wrapt up, and accordingly invented this method of philosophising: his extensive genius led him to consider the state of all the sciences, wherein he discovered a great many defects. This put him upon his great work, *De dignitate et augmento scientiarum*; a book that must be valued as long as there remains any taste for true learning. In it he shews the progress that had been made in each science,
and

and what seemed yet to be wanting. In his *Novum Organum*, he has traced out the way of experience, by which we may arrive at much useful knowledge. The first aphorism of this remarkable book, contains more true sense than all the books that have been wrote by all the gentile philosophers that went before him; it is this, "Homo naturæ minister & interpres, tantum facit, & intelligit, quantum de naturæ ordine, re vel mente observaverit, nec amplius scit aut potest." Here he lays the foundation of our power and knowledge upon the observation of things and their connections. But if we possessed no more knowledge than what our own abilities, when left without any assistance, would acquire, small would our knowledge be.

Sir Isaac Newton, from whom this philosophy has its name, at 24 years of age retires from Cambridge, having previously read Des Cartes, Kepler, and other modern philosophers, and seeing the romantickness of their system, he sets about finding truth in a more rational way than any of his predecessors, believing nothing but what he found by experiment to be true. He discovered a very pregnant

nant and very extraordinary genius, which he improved by indefatigable application; but no naturalist, let his parts be never so acute, can do more than shew one sort of matter moved or acted upon by another, and so backwards or forwards till it be out of his reach. 'Tis vain to attribute any properties to inanimate atoms but solidity bounded by surface and figure, and liable to impulse: ignorance of the scriptures, which alone can inform us of the laws and properties of matter, and the nature and manner of the operation of the mechanical agents, hath produced numberless absurdities, heaps of mathematical conclusions without any data, and contradictory systems upon systems. When a man of an inquisitive and happy genius has compiled together a set of principles adapted to the itching humour of the times, and is of consequence in high esteem as a philosopher, any errors that he advances go down glibly with the people.

It is evident the great Sir Isaac Newton placed too much trust in experiments, which, no doubt, is a very rational way to search after truth, when we are left to ourselves without any
guide;

guide; but he expected too great discoveries from his prism, hole in a window, camera obscura, pendulum of a clock, telescopes, air-pump, pair of compasses, &c. and made use of words, such as attraction, gravitation, electricity, elasticity, &c. which he never sufficiently explained, and I believe could not, and his followers never understood. His vacuum, which he found so necessary, was borrowed from the heathens, who lost the true knowledge of the different states of the air, and therefore wildly imagined one of its conditions to be a vacuum. This vacuum Sir Isaac found absolutely necessary to preserve his system from tumbling, and indeed, that was not always sufficient; for sometimes he is obliged to call in the assistance of a God to help him out at a dead lift, and makes him act arbitrarily in order to solve a phenomenon which baffled his skill. As he set out upon a wrong plan, all his experiments, great genius, and profound skill in the mathematics, were insufficient to lead him to the truth; nor could fifty years search and laborious experience free him from ambiguity.

In his Optics, he says, " What I call attraction may be performed by impulse, or
" by

“ by some other means unknown to me.” He no doubt understood the mathematical principles of natural philosophy, and acquired an uncommon perfection in calculating proportions: but, as I said before, mathematics are applicable to any data, real or imaginary, true or false, and no wise man would chuse to waste his time in proportioning absurdities and falsehoods.

In the year 1687, Sir Isaac published his Principia, and in the year 1713, a second edition with alterations, and in 1726, a third edition came out, with erasements and additions; and his friends say, that if he had lived longer, though he lived to 86, he designed to have made more. He had got some knowledge of the three conditions of the air, before his death, but all that he says upon it, is uncertain and obscure; so weak and unable are we of ourselves to find out truth. This great man, most certainly, with sufficient data, would have made mighty discoveries; but taking the wrong scent, he spent a life of drudgery, and wore out an uncommon genius, with indefatigable application, in search of truth, and at 86 years of age, spoke with uncertainty of the most important points of philosophy.

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Does any person pretend to understand mathematics, algebra, or any other science, or to perform any operations therein, without learning the rules, and having proper data to work upon? therefore we ought not to pretend to compare and weigh ideas, which come not within the reach of our senses, without applying for information to revelation, where they are conveyed under borrowed ideas. If a man by observation and reasoning, could discover that the material agents were only an inanimate machine, and what such a machine could do, he might naturally conclude, that they required some superior being to put them in motion. But this is so far from being the case, that no one, without the benefit of revelation, ever dreamed, or could dream, of the dependent state of the universe; on the contrary, the wisest and most antient of the heathens, had no *Jupiter optimus maximus*, but the heavens, and no soul of the world, but the air.

Whoever wishes to know more of this philosophy, may consult the writings of the author, Boyle, Bacon, Derham, Ray, Locke, &c.

Whoever

Whoever takes a view of the vast extent of things, and considers how limited and confined human faculties are, the uncertainty of experiments, and how liable we are to be imposed upon, will easily discover how small a share of knowledge the wisest man would attain, in his short life, by experiment and his own observation; and will not entertain too high notions of the extent and infallibility of his knowledge. This the great Mr. Hutchinson seems to have been sensible of, and accordingly searched in order to see, if God had left man any other means of coming at knowledge, than his own observations, and accordingly, to his great comfort, he discovered treasures of knowledge, truths which were from the foundation of the world: his philosophy he took from God, and would believe nobody but God alone, who speaks in the holy scriptures, and there teaches true philosophy. Mr. Hutchinson founded a new system of philosophy, or rather revived and restored a very old one, as old as Adam.

THE HUTCHINSONIAN PHILOSOPHY.

This philosophy has its name from Mr. Hut-
chinson, and is briefly this; God, says he, made
out of nothing, the original atoms or first ele-
ments, of which all substances, air, earth, wa-
ter, &c. are composed. This first matter, or
original chaos, consisted of an immense, though
a determined number of atoms or units, each
solid, indivisible, impalpable, and passive, except
when put in motion, they are liable to external
accidents, so as to rest upon, rub against, resist
and adhere to, or change places with one an-
other. Those which are so formed as to cohere
in certain large masses, are solids; those of an-
other form, which seldom adhere, but in
smaller masses and grains, are fluids. For these
atoms might, notwithstanding their inconceiva-
ble minuteness, be created of different shapes
and sizes, such as would best compose those
various substances, or visible forms, for which
God designed them.

Any particles of matter, so minute, as easily to
lodge in, or pass through the interstices or pores
of our own and other bodies, cannot be pierced;
and

and therefore some have thought proper to term the space they occupy a vacuum; but these corpuscles, when collected into masses, may even be palpable, or when in extreme motion, so as to impinge and strike forcibly on all sides, they cannot fail to be perceived in a very sensible manner. Thus it is in respect to air and fire; and the existence of these units is further proved from the power of one species of them, put in motion, to pervade the pores of the hardest metal, and to dissolve its parts. 'Tis evident from the effects, though we cannot prove the units themselves, that each sort must be of a particular figure and dimension, so as to be more or less liable to the accidents above mentioned, and that no force, friction, or collision, can deprive any one of them of its original size and form. As, therefore, matter cannot act upon matter, or preserve the motion impressed upon it at first, but by contact upon all its parts, the universe must be absolutely full, and limited within certain bounds,

All matter, as originally created, he distinguishes into two chief or original kinds, the heavens and the earth. By the first, he means all that matter, which at first was chaotic darkness, or dark stagnant air, out of which the

whole firmament or expansion, called the heavens, was formed. By the other, he understands all the particles of earth and water, as they were mingled together in one vast confused sphere, all uncompacted, subsisting in loose and separate atoms, in one mixed invisible mass, too small for sight, till sorted and united in forms.

This mass was surrounded by the thickest darkness, or matter of the heavens. Thus stood the chaos, or original unformed matter, at its first creation.

The spherical chaotic mixture of earth and water, called the deep, Mr. Hutchinson supposes hollow, containing in its cavity, matter comparatively void, air at rest, called darkness, or dark, inert, dead matter, which lay upon the face of the deep, pressed and surrounded it within and without.

Matters standing thus, that darkness or matter out of which the heavens were formed, and which surrounded and inclosed the spherical chaotic mixture of earth and water, called deep, being put in motion by God, assumes a distinct or distinguishing name; it is now stiled spirit,
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that is a moving air or wind. God calls it his spirit, thereby asserting it as the work of his own hands, against those who made it independent of the creator, and set it up for their Jupiter, or supreme God. This spirit, or air, thus put in motion, did not blow horizontally along the earth as our wind, but acted perpendicularly upon it, and, in consequence of its agitation, generated, or became light, which was no new creation, but a permission for a substance, which already existed, to assume a different condition. For the matter which was formed into light, or rather by its own action and motion formed itself into light, was upon its first creation darkness or stagnant air; and by the motion, which God caused in it, it became spirit, or moving air: by the continuation of that motion it became light. For light, as observation and experience demonstrate, is nothing but air rarified or ground smaller, by the collision of its concreted parts amongst each other. This our philosopher illustrates, by comparing darkness or gross concreted air to wheat in the grain, and light to the same when ground into flour.

A grain of wheat may represent the original chaos, and when ground into flour, seconds,

and thirds, may symbolically pre-figure matter in its three conditions of *fire*, *light*, and *spirit*, which are types of the trinity, *Father*, *Son*, and *Holy Ghost*.

The atoms, which compose the heavens, expanse, or firmament, and are alternately formed into fire, light, and spirit, are all the same substance, figure, and size; and being of the smallest kind, are least capable of cleaving together or concreting. But it appears, that when in a slow motion and great compressure, they are formed into small masses or grains; which, because masses of one species of atoms cannot have pores to admit other atoms of the same species, must be considered as solids, although when loose and fluid, they change places with incredible celerity. The same atoms, in the action of fire, can split the grains of those which adhere, and send them out, so split, in streams of light, which has a capacity of pervading the pores of solids and fluids, composed of the other different sorts of atoms, and so acting upon them in all directions. At a great distance from the central fire or sun, they are again composed into grains of spirit, so large as to be incapable of entering the pores of other solids

solids or fluids, but reach over them, press upon the whole surface, and thus keep the body in its natural state.

Now we have got another instrument produced to form and polish the earth, viz. *light*. Light is the cause of growth and the embellisher of all things, and which was judged by God perfectly capable of answering those ends. This agent was brought to its greatest perfection the fourth day of the creation, at which time it was placed in its proper center, the orb of the sun.

Light now being formed, or having formed itself out of darkness, by dividing and separating of its parts from the concentered grains of darkness, acquired extreme agility; hence the vicissitude of night and day, morning and evening.

The firmament, or expansion, arising from, or formed by a continual attempt of the air, or matter of original atoms to expand, produced and continued from the motion of their parts, some in the condition of spirit, others in that of light, amongst one another, was the instrument, which, by expanding and dilating itself, was to
act

act from above and below upon the face of the watery chaos, which was in form of a hollow sphere, the cavity filled with dense air, and the convexity surrounded with thick darkness, as a swaddling band. The convexity of this watery chaos, is called in scripture the face of the waters, either because the greater part was water, and the whole in form of a muddy water, or because the deep towards its surface might be clear and free from a mixture of earthly particles, or atoms of a larger or more angular figure. The spirit put in motion pressed this watery chaos equally on all sides, so that the waters could neither descend nor ascend until there was light, which, by penetrating into and through the midst of the waters, was to lay hold of and separate all the solid parts, compress them together with two equal forces counteracting each other, one force pressing from the center, and the other from the circumference, and by this means compact and form a solid and hard shell or crust in the middle, out of those atoms, which before were loose and separated. Then the waters, under the heaven or expansion, covering and spreading themselves over the external surface of the solid shell, were gathered to one place, and the solid

solid shell or dry land appeared. The waters upon the earth's surface which were to be gathered, could have no place to go to, till the solid sphere, which was as a wall between them and the inferior waters, was first broken and cracked into holes or fissures, and passages opened for them to drain downwards into the abyfs, by the continued and increased action of the inner expansion or firmament, called the firmament under heaven, which made way for the waters to be gathered to one place. For all the space underneath was already filled with air and water; therefore the air that remained within, must have been displaced by the descending waters driven downwards by the violent pressure of the outward expanse. As the waters went down, the air came up quantity after quantity, till the place of the air or inner expanse was entirely occupied, and the waters were all become one vast united body within the hollow of the earth's sphere. Their impetuous course towards the apertures, fissures, or funnels, and their descent through them, must undoubtedly have torn off and carried down a very considerable part of the earth from its surface and its bowels, into the abyfs; hence that vast inequality in the earth's surface, divided into mountains, plains, and vallies, thro' every

every tract of it; the parts of the earth, which were driven before and along with the waters, formed a solid sphere or *nucleus* at the center. Nor could this be done without many furrows and channels being left in the earth for the reception of smaller streams, rivers, and lakes; as the waters retreated, that which went last, by means of the compression of the expanse, and remained standing in the inlets, when the reservoir within was full, constituted our seas.

The heavens, expanse, or air, in its three conditions, are the self-moving machine, and there is no other; wind-engines are moved by the spirit; water-engines by the force of water under the spirit's pressure; steam-engines by light and spirit, acting on that vapour contrary ways; and in the same manner strength and mechanism are imparted to animals. This subtle agent is so adapted, by its different degrees of fluidity or concretion, as to fit and fill every kind of interstice: every corpuscle of passive matter is surrounded by its substance, and nothing is hid from its effects. By the greater expansion of light with fluids, than the outward compression of the spirit, plants, and animals swell to their due size.

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Our philosopher says, that at the deluge, the great deep was forced again to give up its waters through those fountains, or apertures, which admitted its passage at first downwards, by the super-natural irruption of the air into the cataracts, funnels, or sluices, called in scripture, *the windows of heaven*; because these cracks, funnels, or holes, were first made by the expansion of heaven. The shell being thus broken, dislocated, and shattered into fragments, the spouts of water must have been amazingly terrible, and the consternation of the perishing world, surrounded with a darkened sky, and the elements in confusion, must surpass all description.

The air had access through innumerable fissures and ruptures, which are observable in most sorts of strata; hence the waters would be pressed up, with the same impetuosity those rushed downwards, quantity for quantity, and the repetition of this force would gradually dissolve the solid earth into smaller particles, while softer and yielding bodies would be less susceptible of its destructive influence. Thus the earth, says he, was dissolved, and again reduced to its original chaos; and was reformed into the appearance it has now put on by the same

same mechanical agents, and after the same manner as the antediluvian world was formed.

This his philosophy of the creation, dissolution, and reformation of the earth, he endeavours to prove from scripture, and the testimony of the heathens in their idolatries and false systems of philosophy; which he proves to be stolen from revelation, which they had corrupted and falsified to their own confusion.

This system, Mr. Hutchinson affirms, is full of created matter, atoms, or invisible particles; and the diversity of bodies arises from the various combinations of these, of different forms and sizes, variously figured and disposed. He laughs at the notion of a vacuum, and of dividing matter ad infinitum. If matter, as he justly observes, were infinitely divisible, no agency could subsist.

The heavens, expanse, or air, exists in two conditions, *light* and *spirit*, abstracting the orb of fire or sun, which he supposes at the center. The light presses outwards, and the gross, stor-kened, frozen, or congealed air, or spirit, rushes in. The center is the theatre of action, and is a culinary fire, where the spirit is melted
down

down and sent out in form of light; which must be again reformed into a spirit, otherwise the action would cease. For the gross air pressing in from one side, by the action of the solar orb or central fire, is melted down and becomes more subtile, whereby it can pervade the pores of all bodies, and run against, break, and tear the gross air into its constituent atoms: and in this condition issues out in form of light; for by means of its subtilty, it easily gives way to the pressure of fresh columns of gross air, mixing with it, and forcing its way from behind. So that the atmosphere, expanse, or air, exists in three conditions, viz. *fire*, *light*, and *spirit*.

Fire, or that part of it in the action of fire, at the center, or in the orb or body of the sun.

Light, or the streams of light, when it issues out of that orb, and is otherwise called the rays of the central fire, or sun. And,

Spirit, or gross palpable darkness, thick, frozen, storkened air, or grains of air, at the greatest distance from the central orb or sun, returning inwards from the circumference, and falling

falling in to supply the flaming orb at the center with fuel.

And by the constant flux and reflux of the expanse, heavens, or air, in its three conditions, our earth, and the other planets, have their motion, and make their periodical revolutions; the spirit impelling them behind, and the light thinning the air successively on its other surface. As the light is called day, this agent is said to blow, or breath the spirit in the day; and on that part of the surface where it begins to prevail, it is called evening, twilight, or mixture. So by this transaction or trafficking in the heavens, whereby the grains or atoms are making alternate vicissitudes, and so intermingling and weaving themselves like warp and woof, morning and evening are produced. The evening is the edge or going out of our hemisphere into darkness; and the morning is the edge where it turns towards the light.

With respect to us, the edge of the horizon is the extremity of the heavens; and as the daily rolling of our earth to the east, and its annual circle southward, makes a division of its surface into quadrants, so the point, where our
situation

situation is periodically varied, by being turned more or less, directly or obliquely, towards the central source of light and heat, occasion our four seasons.

And as fire generates light, and light subsides into air, and air feeds and supports fire continually in a circle; so by the action of these, the earth generates every thing according to its kind from distinct semina, or radical principles; and every creature is a world in itself, and undergoes the same flux and refluxes as the expanse.

Light, however thin and fluid, takes up just as much space as the grosser spirit, though by reason of its subtilty it gives much less resistance to bodies moving in it, nor does vision, or the effect it has upon our eyes, seem to be the chief use it was designed for. Moreover, the rushing of it outwards, and consequently dividing and bringing in the spirit, must produce a struggle, and so expansion, or a compression upon itself and all things else. Hence the weight of the air, and the effect of that weight, which is gravity.

Light too must have its several degrees, as it is nearer to the fire, or central orb the sun, or at a greater distance, and so more intermixed with spirit.

Thus our author supposes the mechanism established in the heavens or expanse, to consist in an orb of fire at the sun, dividing and melting down the spirit, driven inwards by the light which rushes out in a contrary direction; that this opposite motion, whereby the atoms of light and spirit press each other forward and side ways, forms an expansion or universal lateral pressure, derived from the resistance the gross air and light meet with from each other in their direct course in and out from the sun, and that the whole is so contrived as to be a regular perpetual motion.

The matter of all other solids and fluids is inactive, and subject to the heavens, expanse, or air, in its three conditions, which are the rulers in the universe, and representatives of the three and one God, in their essential powers and operations; though the light acts in chief here, or is the principal agent, with respect to our earth.

Spirit

Spirit is the same, whether irradiating from the circumference, mixing in our atmosphere, in that motion we call wind, or pushing against those bodies, whose interstices are so close that spirit cannot come between them.

So also is light, whether irradiating from the solar fire, in that condition which gives the sense of seeing, when it pervades the pores of solid bodies in a strait line, as through glass, diamonds, &c. or moving through the oblique passages between other solids, without giving that sensation to the eyes.

As the spirit is the instrument of impulse, and presses upon surfaces in proportion to its density, or the size of its grains; so wherever it cannot come, the light reaches, and whatever it cannot do, the light performs, and nothing can exclude light but the very substance of an atom. Hence it is, that no part of this tripple fluid can be separated from the rest of its own species.

A ray of light, says Mr. Hutchinson, is a very small pillar of the fluid, issuing directly outward from the sun till something interrupts

it; in proportion to the solidity, or to the form or construction of the pores of that body, which interrupts, part of the light passes thro', part of it rebounds, and changes its course, allowing always for the inclination of the surface it falls upon, and for the refraction which it suffers by passing through and striking against the corpuscles of a different medium. The reflexion is strongest from a smooth or polished surface, because when the surface is angular, the line of rebound makes a right angle with the side of the angle which it strikes, and so the light is thrown off obliquely.

All light from the sun pushes in a sphere from the center, and is reflected from every point of the surface, which obstructs its progress. If the light fall perpendicular and all pass through, you cannot see the surface; in proportion to what passes, and to what is reflected, the different surfaces appear coloured. If the body be of different thickneses, it will appear of different colours. So plates of glass change colour by being viewed separate, or one behind another. Where the motion of light is brisk or fiery, the surfaces seem nearly red, and in less degree approaching to white. The eye perceives

perceives the body at an angle, the legs whereof are extended to the outside of the body; so the medium of vision is a triangle, or cone of light.

The rays of this fluid light from the sun, are repulsed or reflected from the plane they strike upon, in supposed straight lines; which reflection, in a clear hot day, may rebound to other solid bodies, several times, and this agitation considerably augments the force of the lucid stream. If the rays be reflected or turned back in the same line they came, their force is almost doubled, they receive a lateral outward direction from the atmosphere, which is apparently great in the evening.

That part of this fluid, at the sun, or in violent motion, is fire, at some distance heat, further off warmth, next light, which grows fainter, as the motion begins to cease, or is interrupted, where its action is least darkness and cold, at the greatest distance from the furnace, or central fire, it is wholly unactive, storkened, and congealed. And perhaps the fixed stars are set at so great a distance to return the light, in order thereby to prevent a stagnation of the

grosser æther, and to assist it in finding its way inward.

Thus the sun is not only the eye of the world, but also the furnace, where all things are prepared, and is itself a body of liquid fire, which can divide the corpuscles of any solid body without pushing the body forward.

Our author accounts for gravity, lateral pressure, elasticity, and for every other species of mechanical motion. Thus, says he, there lies a compressure upon every unit or part of matter, which can only be perceived, when the masses composing that fluid, called the firmament, expanse, or heavens, are smaller on one side than another; and in proportion as this difference increases, it comes more under our senses. So the external pressure of the air appears to be immensely great, compared with the resistance of those parts which can pervade the pores of copper, or glass vessels, &c. Wherever there is a difference of consistence in this fluid, the pressure tends thither; and the degree of pressure is according to that difference, and in the same proportion as the subtler part recedes in the opposite direction. The circumstances of the body which comes between,
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or obstructs the free action of the firmament, are, however, to be considered, as its dimension, the largeness of its units, or the straightness of its pores, and the pressure diminishes from the surface of the body outwards, and within towards the center, in some proportion to the distance either way. These pushes of the masses of air, or spirit, among the looser parts in light, and towards those which are loofish and in the greatest action or fire, will, when duly attended to, account for what we call gravity, &c.

As our author is for rejecting all unmeaning names hitherto used by philosophers to express those powers in nature, which they did not understand, so he excludes chance or accident, so far as these words are made to denote any thing irregular in the divine workmanship, and insists, that every phænomenon in the universe is the effect of infinite wisdom and design.

Elasticity has been a term for an occult quality, when some fluids expand, and when some bodies bent are made to react. This quality cannot subsist in the units, because they are solid and inflexible, therefore it must arise from the form of the bodies, and the inter-

vention of other matter. When some parts of the surface of a body are divided by the subtile atoms forced in there, while the other parts of the surface adhere, the body is kept bent, untill the compression be counteracted or taken off by the air: when the subtile atoms recede, and the figure of the body is restored, the same action of æther which makes bodies elastic, when augmented can destroy their elasticity, for this quality is not proof against fire.

Mr. Hutchinson says, where vapours from the earth or sea are denser than the neighbouring air, they press thither, and produce that motion we call wind.

Our author in his attempt to explain the œconomy of the human frame ascribes much to the operation of steam in the body, and perhaps carries his notion of the action of this steam much farther than experience will countenance him in; and must, I think, stand corrected here, and in other parts of his treatise upon that subject; but *humanum est errare*.

Thus I have briefly given an account of the Hutchinsonian philosophy. Whoever is in pur-

suit of, or desires an acquaintance with, such important truths of nature, as are contained in this philosophy, after acquiring a tolerable knowledge in classical learning, mathematics, and Hebrew, must apply to the author's own writings, which are Moses's Principia, part 1, and 2.—Sine Principio; or the meaning of the Names and Titles of God, &c. The Confusion of Tongues, and Trinity of the Gentiles, &c. Power Essential and Mechanical; or, what Power belongs to God, and what to his Creatures, &c. Glory or Gravity, or Glory Essential; and the Cherubim explained. The Hebrew Writings perfect, &c. The Religion of Satan, or Natural Religion; and the Data in Christianity, part 1, &c. The Data in Christianity, part 2. The Human Frame; or, Agents that circulate the Blood, explained. Glory Mechanical; or, the Agents of Nature, and manner of their Agency, explained, &c. A Collection of several Tracts. On the Instincts, in the several Orders of Creatures. On Mining. Observations on Things under Ground. The whole making 12 volumes in octavo, with indexes. London, 1749.

Mr.

Mr. Hutchinson, the founder of this philosophy, seeing the insufficiency of the Newtonian method for attaining a true knowledge of nature, and her operations, was happily led into other means. He applied for instruction to the fountain of knowledge Divine Revelation ; and soon displayed a wonderful depth of genius, which he improved with unwearied application and indefatigable steadiness.

When he had received the lower parts of a regular education, he went through a course of Geometry, Mathematics, and experiments, under a faithful domestic tutor, whom his father took into the house for that purpose, and of whom he knew nothing till that time, and never afterwards heard what became of him : this tutor was an excellent mathematician, and taught our philosopher as much pure unsophistical knowledge as he could have any use for : this he soon after found opportunity to improve by a variety of observations and experiments. He was early engaged in business, being appointed agent to the Duke of Somerset, which brought him to London about the year 1700, introduced him into the best company, and gave him access to know most of the cabals then carried on
with

with the parties concerned. Here several of the philosophers sought and cultivated his acquaintance, led him into the Royal Society, and asked him many questions; but he was soon convinced by much personal conversation with Sir Isaac Newton and his followers, and more fully by their books, that their notions and his were very different.

About this time, Dr. John Woodward seemed to leave the party, whom he had offended, by publishing an account of the Deluge somewhat agreeable to scripture, so he listened to Mr. Hutchinson, insinuated himself into his intimacy, and a kind of partnership ensued. Mr. Hutchinson's affairs led him to make very distant travelling circuits, wherein he had occasion to take accurate surveys, as well below ground as above, with many new observations; to support which he was continually collecting proper samples or specimens of natural things; these, he from time to time transmitted to his partner, who undertook to distribute them into classes. But after labouring thus jointly for ten years, unluckily the Doctor relapsed to the doctrine of gravity, threw up the expansion, which he did not well understand, and was reconciled with Sir Isaac,

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the head of the party. This determined the fate of Mr. Hutchinson's collection, which Dr. Woodward basely pilfered and ranked as he pleased; nor could he be prevailed upon to give any satisfaction concerning it, whereby the owner was induced at last, in the year 1724, to publish the first part of Moses's Principia in his own defence. However, his partner would not relent, but persisted till his death in an unjust detention of what he had no manner of right to; and thus was Mr. Hutchinson bereaved of a valuable collection, which he was very able to render highly useful to the world. The next year after he published Moses's Principia he printed his Essay on the Natural History of the Bible. In the year 1727, out came the second part of Moses's Principia, and a few weeks after Dr. Clark sent to him with high compliments of the performance and the discoveries it contained; but on some pretended difficulty he desired a conference, upon which Mr. Hutchinson sent for answer, that the book had cost him much labour to compose, and when he had considered it a year, it then would be time enough. As Dr. Clark continued to tease him from time to time, our philosopher was forced to tell him plainly that he had been too forward in writing
about

about subjects he knew nothing of, but that if he pleased to publish the proposition he did not like, he would meet with a proper answer; however nothing appeared. The Doctor applied to the Hebrew, but died in about a year after.

In the year 1729, Mt. Hutchinson published Moses's *Sine Principio*; and in the year 1731, his *New Account of the Confusion of Tongues*, and the names and attributes of the Trinity of the Gentiles. His private character was unexceptionable, bating human frailties, which all are subject to, he shewed himself a true and serious christian, whose behaviour was the fruit of faith founded upon the strongest and most rational evidence.

His manner of writing was rough and blunt: but we are to consider in his excuse, he was writing no romance or fairy tale; he did not think that a flow of soft and unmeaning words, and fine turned periods, was his business to study, who had things to lay before his readers of the utmost importance. He was to teach them a science they knew not before, and to make them acquainted with the secrets of antient philosophy and divinity; to do which, there was
much

much rubbish to remove, many words to construe, and a variety of objections to obviate.

His writings were to clear the way, and to lay in materials for those who should have more leisure to play the orator. They may be furnished from his writings, with language nervous and masculine, a proper choice of words and exact descriptions, which they may more agreeably arrange, if they please. 'Tis true, his periods and sentences are long, and there are more parentheses than one, who reads to divert himself, would chuse; yet whoever peruses him with care, will find his trouble well bestowed, and abundantly repaid.

He proves the scriptures a regular, uniform, consistent system of natural and sacred truths: and shews us the steps of that ladder, which God, in his infinite mercy to fallen man, let down from heaven to earth, as the mean of communion between both. He appeals to our senses for the perfection of the Hebrew language, on which all his discoveries are founded: he insists that it is ideal, incapable of being wrested, and the primary source of real knowledge; here those articles of our faith, which, through ignorance

rance of the Hebrew tongue, where almost disputed out of the world, are established as on a rock.

This great man has now made it an easy matter to prove to conviction a trinity in one substance; the oath of mercy entered into by the great ones before this world, and the coming forth of one of them to assume our nature, and atone for our offences; while the third engaged to support us by his influence against our potent and subtle adversary. These writings explain the names of their titles and offices, the manner of each performing his part, and the duty required of us, from the genius of the primeval language, conveying the clearest ideas by means of hieroglyphics, or sensible and emblematical descriptions; and all this illustrated from the purest principles of philosophy, pointing at the heavens, or aerial matter in its three-fold condition of fire, light, and spirit, its perpetual motion and mechanical agency, whereby it performs all the operations of nature, and was therefore worshipped by the nations who forgot the invisible trinity, and gave themselves up to imagination, though the heathens themselves always had their idolatrous trinity.

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By the writings of Mr. Hutchinson we know what they mean by *Jovis omnia plena* ; and that even then, they spake better philosophy than when we talk of a vacuum and occult qualities.

Having now given a short account of the various systems of philosophy that have prevailed in different ages of the world, with a short account of the authors of them, I shall proceed to treat of the third division of knowledge, viz. Mathematics.

C H A P. VII.

O F M A T H E M A T I C S.

MATHEMATICS is the science of quantity. Whatever is capable of being increased or diminished, is the object of mathematical knowledge, or mathematics; and as quantity is of two kinds, viz.

1. Continued quantity or magnitude ;
2. Discrete quantity, or number ;

hence mathematics are of two kinds; that part which treats of the first of these is called Geometry; and that part which has the second for its object is called Arithmetic.

Geometry is a most spacious field, and gives employment to the learned and curious; many ingenious and useful arts in life, are either branches of, or founded on and connected with the mathematical sciences, which comprehend a great many branches of learning, and many of

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the mechanical arts, which are useful and necessary to common life.

Geometry was at first confined to the measuring of land, but it comprehends, Plain Trigonometry, Fortification, Navigation, Dialing, Engineering, Gunnery, Architecture, Statuary, Spherical Geometry, Spherical Trigonometry, and Geography.

Under the word Geometry, three distinct parts are comprehended; viz. Altimetry, Longimetry, and Surveying.

Quantity, which is the object of mathematical knowledge, taken in the largest sense, includes whatever is capable of being increased or diminished: upon which account some authors doubt not to comprehend all things, that admit of this property, under the object of mathematics. But if this were the case, all moral qualities would be the object of mathematics, such as love, pleasure, hatred, pain, virtue, vice, &c. which do indeed admit of more or less, yet are not capable of being measured by any material standard measure, or being brought under the rules of calculation,
which

which is necessary in order to constitute any thing the object of this science.

By quantity then, as it is the object of mathematics, we are to understand, not only whatever is capable of being increased or diminished, but likewise exactly measured, by comparing it with some known standard, or computed by applying arithmetical calculations to it; as addition, subtraction, multiplication, or division.

Quantity, taken in this sense, is either proper or improper; of proper quantity there are two kinds; viz. Magnitude and Number, to which some add Ratio.

Magnitude is that which answers to the question *how great*? Number is that which answers to the question *how many*? The former is the object of Geometry, the latter of Arithmetic, and Ratio belongs to both.

Of mathematical quantity taken improperly, many different sorts may be conceived, such as velocity, motion, force, weight, light, sound, time, and such like; the knowledge of whose phenomena and properties has always been

considered as belonging to the mathematical sciences.

The matter may be considered and explained thus :

Magnitude and Number (to which may be added ratio or proportion) when considered as abstracted from every particular subject existing in nature, are the objects of Geometry and Arithmetic, and accordingly Geometry and Arithmetic are the only branches of pure Mathematics.

But seeing those things, which are called quantity improperly, such as velocity, motion, force, compression, &c. are capable of being represented, measured, and computed by magnitude, number, and proportion, and their phenomena explained and demonstrated by the help of Geometry and Arithmetic ; hence Mechanics, Music, Optics, Perspective, Architecture, and other such like branches of knowledge, where pure mathematics are applied for investigating the laws, and solving the phenomena of the various parts of the material world, which are commonly called philosophy, or natural philosophy, have been considered as parts of the mathematical

thematical sciences, such as Astronomy, Geography, Pneumatics, or the doctrine of air, &c. But as in all these, and such like sciences, Magnitude and Number, are not considered purely and abstractedly, but joined to, and as it were, mixed with some particular matter or subject, existing in nature, for solving of whose phenomena, geometry and arithmetic are applied, hence such branches of knowledge go under the name of mixed mathematics.

The word mathematics is derived from the Greek word *μαθησις*, which originally signifies doctrine, discipline, or science; but upon account of the superior evidence, usefulness, and excellency of the science of mathematics, the antient Greeks appropriated the word *μαθησις καὶ ἐκχρησιν* to this particular science, as if one should say, by way of distinction, the Science or Discipline.

As mathematics comprehend many different branches, the Greeks, to express their multiplicity, termed the whole complex body of them *ἐπιστηματικὰ θηματα*, the Mathematical Sciences; from the latter of these two words, mathematics is immediately deduced.

GEOMETRY is the science of magnitude, otherwise called concrete, or continuous quantity, because this kind of quantity has its parts immediately joined together. It is partly speculative, and partly practical.

The speculative part of geometry treats of and demonstrates the properties and relations of magnitude. The practical part teaches and demonstrates the art of measuring, with the greatest exactness, all kinds of magnitudes, which are included under lines, superficies, and solids.

Geometry is called a science, by which we understand a system of certain knowledge, regularly and methodically digested. For surely, if any part of human learning deserves the name of science, pure mathematics, of which geometry is one branch, has the best title of all others to it.

The principles upon which geometry is founded, are few in number, and simple and evident in their nature; and the doctrine itself is established upon the highest degree of evidence that any truth can admit of. Different things, according to their different natures, admit

mit of different degrees of evidence, some more, some less.

In our present imperfect state we are obliged to receive many things, as true, upon a very small degree of evidence; and the greatest part of truths, by much, admit of no higher evidence than that which is called moral evidence, or probability; the nature of which is, that after weighing, as in a balance, the arguments upon both sides, both for and against the truth of any thing, we find the arguments upon one side to preponderate; and according as the preponderance is greater or less, so the degree of evidence is proportionably greater or less; and there are but few cases where this probability, or moral evidence, can give such an assurance to the mind, as entirely to free it of all doubt; because still there remains a possibility that there may be some arguments on the other side, which, upon account of the narrowness of our understanding, may have escaped our knowledge and observation. And yet we have no other evidence than this to conduct ourselves by in the greatest part of the affairs of human life; nay, nor in some of our greatest and highest concerns. Notwithstanding all this, he would act

most unreasonably, who should reject moral evidence, where the nature of the subject will not admit of any other; it being as much opposite to that reasonable nature God has endowed us with, and consequently to his will, to refuse our assent upon moral evidence, where the nature of the subject admits of no other, as it would be to deny that five is greater than three, because five does not exceed three so much as it exceeds nothing.

There are very few things, besides mathematical truths, that admit of that kind of proof or evidence, which is called apodictical, scientific, or demonstrative, by which we understand the highest degree of evidence, that any truth, not self-evident, can possibly admit of; being such as our powers, the mind, and from the very frame and constitution of our nature, extorts our assent, whether we will or not; and this is one of the chief excellencies of pure mathematics, above all other sciences; all its truths are attended and established with this scientific evidence, so that geometry is a science in the strictest sense of the word.

Geometry, *γεωμετρία*, properly signifies mensuration of earth, or land, being compounded of the
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the two Greek words $\gamma\eta$ and $\mu\epsilon\tau\rho\epsilon\omega$, the first signifies earth, or land, and the other signifies to measure.

The reason this science got this appellation, was this :

The river Nile, in Egypt, annually overflows its banks, and always did so from the earliest accounts we have of it, by which means the boundaries of the adjacent lands were broken down and defaced ; wherefore the antient Egyptians were under a necessity of contriving an art, by which they might be enabled to measure out the lands, belonging to the several proprietors, and, upon the falling in of the river, to lay them out again, according to their respective properties ; and therefore as the art of mensuration was in this manner first applied to the measuring of land, hence the science obtained the name of geometry, which was afterwards improved and extended to the mensuration of all kinds of magnitudes.

As to the order and method in which Euclid's Elements of Geometry are delivered, it is this. He first begins with definitions, the use and design of which is to define or explain
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the true meaning of those things he treats of, which are expressed by certain words or terms of art: and thus all confusion of ideas and ambiguity of words, by which these ideas are expressed, is effectually prevented, which in many other subjects is one principal cause of error and false reasoning.

From definitions, Euclid proceeds to lay down the first principles of the science, upon which, as a foundation, the whole doctrine is built, and to which all truths and practices, contained in it, may be ultimately reduced. These principles are partly practical, and partly theoretical.

The practical principles are called *αιτηματα*, postulata, postulates, in which he asks, and supposes a power and liberty of performing some certain things, the performance of which is easy and obvious, derived from mechanics, or the doctrine of motion.

These principles are the description of right lines and circles, performed with a ruler, scale, and a pair of compasses, which therefore one must be supposed to understand the practice of, before

before he enters upon the doctrine of geometry itself.

“ Linearum rectarum descriptiones, in quibus geometria fundatur, ad mechanicam pertinent, has lineas describere geometria non docet sed postulat,” &c. Newtonii Principia Præfatio.

The theoretical principles upon which geometry is founded, are called axioms, which are certain simple propositions, easily understood, and standing in no need of any proof or demonstration to evince their truth, shew and prove themselves to be true by their own innate light.

They are called axioms, from the Greek word $\alpha\kappa\iota\omega\mu\alpha$, as being highly worthy of being received as true; Euclid himself calls them $\kappa\omicron\iota\nu\alpha\iota$ $\epsilon\pi\omicron\iota\sigma\tau\iota$, common notions, or sentiments, the truth of which every one readily allows by simple intuition without demonstration.

All the axioms prefixed to Euclid's Elements of Geometry, are of this kind, except one, which is the eleventh, in Dr. Gregory's edition
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of Euclid's works, and the twelfth in Dr. Keil's.

This axiom probably has been inserted amongst the rest by some of Euclid's scholiasts, and not originally by Euclid himself, whose extreme accuracy and nice judgment, which appears through the whole of his works, renders it highly probable, that he would not have assumed any thing as an axiom which is not self-evident; and accordingly it is observed, that though Euclid makes use of this axiom, or rather position, in the demonstration of Prop. 29. lib. 1. yet it is not upon account of its being an axiom, but as what easily follows from Prop. 17 and 18. of the same book, to which place therefore it ought to be referred.

As the postulates are the foundation of whatever is practical in geometry, so the axioms extend themselves through the whole of it, serving to connect the several different steps of a mathematical demonstration.

Having laid this foundation of definitions and first principles, Euclid proceeds to the doctrine of geometry itself, which is contained and expressed in so many distinct propositions, some
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of which are of a speculative and theoretical nature, called theorems; others of a practical nature, called problems.

A Theorem then is a proposition, wherein some certain truth is proposed, or laid down, in order to be proved and demonstrated.

A Problem is a proposition, wherein something is proposed to be done or effected, the doing of which is called the solution of the problem; and after the solution follows the demonstration, by which it is shewn, proved, and demonstrated, that the thing, proposed to be done, is truly and rightly done.

Now all these propositions, whether theorems or problems, which compose the body of the science, are delivered in such an easy and natural order, that the whole makes an entire chain of reasoning, of which the propositions constitute the several links, hanging all together, and depending upon one another, in such a manner that there is formed a science or system of knowledge, which far excells all other sciences for its evidence and certainty, the whole and every part being proved and established by
such

such demonstrative and scientific evidence, as has been formerly explained.

A geometrical demonstration is a kind of argumentation or reasoning, called *Sorites* in the schools; which consists of a train, or series of steps, so connected together, that the truth of the one, which immediately goes before and appears by simple intuition, evidently and necessarily produces that which follows, so that the last step must be true, when the first is true; and therefore in this case, the last step, which is the conclusion of the reasoning, is said to be demonstrated, that is to say, made certain and evident to the full conviction of the mind: the meaning of all which the reader will easily understand when he comes to read these elements of geometry.

A geometrical demonstration is of two kinds, one of them is called *ostensive*, or *direct*, where the truth of a proposition or assertion is known or demonstrated directly. Thus in Prop. 1. lib. 1. (see the figure) each of the sides AC and BC being shewn to be equal to the same line AB , it is concluded directly, that the two lines AB and BC are equal to one another, and so in many other cases.

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The other kind of demonstration is indirect, called *demonstratio ducens ad absurdum vel impossibile*; and by the Greeks, *παγωγη*, which demonstrates the thing to be true, because it is proved to be impossible that it can be otherwise; or, which is the same thing, that the denial of it necessarily leads one into a manifest absurdity or contradiction. Thus in Prop. 4. lib. 1. (see the figure) it is demonstrated, that in the application of the triangle ABC to the triangle DEF, the base BC of the triangle ABC must coincide with the base EF of the triangle DEF; because if it did not, or if it be denied that it will do so, we should necessarily be led into the absurdity that two right lines would include space, which is impossible by the tenth axiom; therefore it certainly and evidently follows, that the line BC must coincide with the line EF, and consequently be equal to it by the eighth axiom; and so in many other demonstrations in these elements.

The ostensive demonstration is accounted the more perfect kind of the two, but the other is equally convincing, depending upon this principle, that two contradictory positions cannot both be true at the same time, nor both false
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at the same time ; and that therefore if the one be false, the other must be true.

The advantages arising from the study and knowledge of pure mathematics are very great. By this study the intellectual powers of the mind, especially in young people, are greatly opened, enlarged, and corroborated ; for here a view, a most extensive field of knowledge, the most certain and evident of all others, is opened up, and affords a truly noble, and rational entertainment and delight to the human mind, and satisfies that strong propensity to acquire knowledge, and that ardent love of truth, which are natural to it.

The mind, by this study, is naturally led into a close attention and application of thought, which it finds absolutely necessary, in order to understand and connect the different steps of a mathematical demonstration ; and thus by use and practice, it acquires a habit of attention, which extends itself to all other studies and exercises whatsoever : a matter of no small consequence in training up the minds of young people, who are generally subject to instability

lity and diffipation of thought, which is the great obstacle to all useful improvements.

Moreover, as the most perfect examples of just reasoning are to be found in this science, so by the study of it the mind acquires the art and habit of reasoning justly and accurately upon any subject whatsoever, for example is always more powerful than precept. Upon these, and such like accounts, we doubt not to affirm, that the study of mathematics is extremely useful to young people, by opening, enlarging, and corroborating their intellectual powers. As these are the natural and necessary consequences of this study, so they have been taken notice of by those who are good judges. The celebrated Mr. Lock in his Treatise of the Conduct of the Human Understanding, expresses himself thus: “ I have mentioned the

“ mathematics as a way to settle in the mind
 “ a habit of reasoning closely and in train; not
 “ that I think it necessary that all men should
 “ be deep mathematicians; but that having
 “ got the way of reasoning which that study
 “ necessarily brings the mind to, they might
 “ be able to transfer it to other parts of know-
 “ ledge, as they shall have occasion. For in

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“ in all sorts of reasoning every single argu-
 “ ment should be managed as a mathematical
 “ demonstration, the connection and depen-
 “ dence of ideas should be followed, till the
 “ mind is brought to the source on which it
 “ bottoms and observes the coherence all
 “ along,” &c.

If it be true, what Plato was wont to say,
 Θεὸν αἰεὶ μάλιστα γεωμετρεῖν, that God always acts
 most geometrically; or, as others express it,
 that his works are all done according to num-
 ber, weight, and measure; will it not follow,
 that they who are best instructed in the mecha-
 nical sciences, are best qualified to understand,
 and contemplate the works of the Almighty
 Creator?

If either certainty or usefulness serves to re-
 commend any branch of knowledge, it must
 be allowed that the mathematical sciences de-
 serve a special regard. The evidence by which
 the truths in mathematics are established, is the
 greatest and highest that possibly can be; it is
 called apodictical or demonstrative, which is
 confined almost entirely to this branch of know-
 ledge, and makes one of its chief excellencies.

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The great usefulness of this study appears in two things: 1st. In common life. 2dly, In the improvement of the mind. As to the first of these, there are few useful arts in common life, but owe their original, or improvement, to the mathematical sciences, from the lowest mechanic to the most accomplished artist in sculpture, painting, music, and architecture. A knowledge of the mathematics is highly useful and ornamental to the divine, the lawyer, the physician, the statesman, the gentleman, the general, the sailor, the musician, the statuary, the painter, the mechanic, the farmer, and the merchant, but especially to the philosopher.

Nothing does bring the mind to a habit of reasoning closer and in train so soon as mathematics: it settles the mind, and enables the person to call in his thoughts, and place and settle them upon one subject, in which alone consists the chief art of studying. Mathematics, therefore, I think, should be studied by those, who have time and opportunity; not so much to make them deep mathematicians, as to make them reasonable creatures, and to enable them to transfer that just and proper way of reasoning, which that study necessarily brings the mind to, to

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other

other parts of knowledge as they shall have occasion. But no person, that wishes to be called a scholar, can possibly be without a tolerable knowledge of this science, which in other subjects, besides quantity, is absolutely necessary to just reasoning, and for the conduct of the understanding.

I shall now give a short account of Euclid himself, the author of the Elements of Geometry.

He flourished in the reign of Ptolomy Lagus, king of Egypt, more than three hundred years before the christian æra; later than Aristotle, and somewhat earlier than Archimedes. The place of his nativity is not certainly known.

As to his philosophy he was a follower of Plato. He was the first that opened the school for mathematics in the famous city of Alexandria in Egypt, which gave birth to many of the most celebrated persons for knowledge in mathematics. With respect to his natural disposition he was *suavissimi ingenii vir*.

He composed many excellent treatises, all in the mathematical way, which have gained him high

high reputation in all ages since he wrote ; some of them however have perished through the injury of the times. Of those that remain, Dr. David Gregory, late professor of astronomy at Oxford, has given us a beautiful and correct edition in Greek and Latin, containing fifteen books of Elements of Geometry, and one book of Data, one of Astronomy, two of Harmoniacs, one of Optics, one of Catoptrics, and a small Treatise de Divisionibus, some of which are of a doubtful authority.

As he was of the Platonic sect, it is thought, that the whole of his elements of geometry were composed with a view to explain the five regular solids, called the Platonic bodies, treated of in the three last books. The two last books, viz. the fourteenth and fifteenth, are attributed, not without ground, to one Hypsicles of Alexandria, who lived about two hundred years after Euclid's time ; the other thirteen are, by the general consent of antiquity, attributed to Euclid, not as if he were the author and inventor of every proposition contained in those elements, but by collecting the loose and scattered propositions, discovered by some that went before him, and confirming and establishing,

by legimate and accurate demonstrations, many propositions that had been more loosely demonstrated by others, and withal adding many propositions of his own, he composed such a complete System of Elements of Geometry, as gained him the distinguished appellation of *Εὐκλείδης*.

These elements of geometry are properly divided into two parts, viz. the contemplation of surfaces, and the contemplation of solids; there is no part of our author's writings which treats professedly of points and lines. But as the geometry of solids cannot be understood without the knowledge of commensurable and incommensurable lines; and seeing this is not to be understood without the knowledge of numbers, so these elements are otherwise conveniently divided into four parts. The first is the geometry of plain figures, contained in the first six books, which is again subdivided into three. The first four books treat of plain figures absolutely; the fifth of the proportions of magnitudes in general; the sixth book treats of the proportion of plain figures. The second general part treats of properties and affections of numbers, viz. in the seventh, eighth and ninth

ninth books, which are therefore called books of arithmetic. The third part is taken up in treating of commensurable and incommensurable bodies, contained in the tenth book. The fourth and last part comprehends the geometry of solids, called *γεωμετρία*, which is handled in the three remaining books.

Euclid's elements are composed with so great a judgment, and all the properties contained in them confirmed and established with such accurate demonstrations, that after having stood the test and examination of the best judges for many ages, they have been for above two thousand years, and still are, to this day, the public standard of elements of geometry, which all authors, almost upon any branch of the mathematical sciences, build upon, and refer to, as of unquestionable authority and certainty; whence it is necessary, that they be thoroughly understood by all students of mathematics and natural philosophy; upon which account these elements are commonly taught in all the universities and regular academies for the instruction of youth.

I come now to lay down some directions for prosecuting this useful branch of study.

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First, then, we must read over Euclid's elements of plain geometry, contained in the first six books, in such a manner as to be masters of them; they must be considered as the rudiments of mathematics, and ought therefore to be perfectly understood. And when I here speak of these elements being understood, I would take occasion again to put the reader in mind, that it is absolutely necessary, that, in every branch of study, one carefully observes what degree of certainty it is capable of. For, on the one hand, a person egregiously mistakes, who requires or expects scientific evidence or demonstration, where the nature of the subject won't admit of any thing above probability or moral evidence, founded upon probable arguments, upon sufficient testimony of others, which is all the evidence we can have for the most part of things in human life, for matters of fact, which we ourselves are not ocular witnesses of, and even for the most part of those things which go under the name of knowledge or science. But on the other hand, he equally mistakes, who satisfies himself with probability or moral evidence, let it be never so great, where the subject is capable of strict demonstration; which is the case

case in mathematical truths, where no lower evidence ought to be admitted. Therefore, we are not to reckon we understand such truths, and particularly the elements of geometry, unless we find ourselves necessarily obliged, whether we will or not, to yield our assent to them, and clearly perceive, that it is impossible but they must be true.

Whoever is qualified, and has access, should read Euclid's elements in greek, the original language in which they were wrote. For, according to the opinion of the best judges, there is a certain *ακριβεια* in the demonstrations of the ancient greek mathematicians, and particularly in those of Euclid, which are rarely found amongst the moderns. Their compositions therefore, upon that account, are more proper for forming the minds of young people, to an accuracy and justness of reasoning, which is one chief design of these studies. But in any case it is proper to use Euclid's own demonstrations, which you find in the translation of his works by Comendine in Latin, and by Mr. Keil, and afterwards by Mr. Cun, in English.

Dr. David Gregory has given us a beautiful and correct edition of all Euclid's works in
greek

greek and latin, in the preface of which you have a full account of Euclid and his works, and the reason for preferring his method and demonstration to any other.

Dr. Robert Simpson, professor of mathematics in the university of Glasgow, published in the year 1756, an edition in latin of the six first books, together with the eleventh and twelfth of Euclid's elements, in which he has pointed out some errors and mistakes that have been introduced into this part of Euclid's works and has made some additions, which well deserve to be known by such as wish thoroughly to understand those elements.

2dly. The business of trigonometry is to find the angles when the sides are given, and the sides when the angles are given ; or both may be given to find the remaining sides and angles : For the doing of which, it is necessary that not only the periphery of circles, but also certain right lines, drawn in and about circles, be supposed divided into some determinate number of parts.

The ancient mathematicians thought fit to divide the periphery of a circle into 360 parts, which

which they call degrees, and each degree they divided into 60 minutes, and every minute into 60 seconds, and every second into 60 thirds, and so on; and every angle is said to be such a number of degrees and minutes as there are in the area measuring that angle.

There are some that would have a degree divided into centesimal parts, rather than sexagesimal ones; and it would perhaps be more useful to divide, not only a degree, but even the whole circle into a decuple ratio, which division some time or other may take place.

Now, if a circle contains 360 degrees, a quadrant thereof, which is the measure of a right angle, will be 90 of those parts, and if it contains 100 parts, then a quadrant will be 25 of those parts.

The complement of an arc is the difference thereof from a quadrant.

A chord, or subtense, is a right line drawn from one end of the arc to the other.

The right sine of any arc, which is also commonly called a sine, is a right line drawn
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from one end of an arc perpendicular to the radius drawn through the other end of the said arc, and is therefore the subtense of double the arc.

The supplement of an arc is the difference thereof from a semicircle, or 180 degrees, being the half of 360.

This definition is not inserted amongst Euclid's, but is mentioned, and often occurs in reading.

When we have read the first six books of Euclid's elements, we should then return and revise those propositions of plain trigonometry, which contain the foundation upon which the canons for the solution of various cases of plain triangles, whether right angled or oblique angled, are built. These propositions are, 1st, 11th, 12th, 13th, and 14th, of that treatise of plain trigonometry, at the end of Keil's or Comendine's Euclid; which propositions must be thoroughly understood, as also the canons and propositions by which the solutions are performed. These canons are reduced to two tables; one for right angled triangles, and the other for oblique angled triangles, both placed

placed at the end of the above mentioned small treatise of trigonometry.

Those canons should be so digested, as that we may be able readily to state the propositions, by the help of which, the several cases of triangles may be solved. The propositions of plain trigonometry I have mentioned, commonly go under the name of axioms amongst the generality of writers upon trigonometry, and will be the proper place for projecting geometrically the various cases of triangles, by the help of the line of chords, and a line of equal parts, contained in the plain scale ; by the first of which angles are laid down and measured ; and by the second, the lengths of the sides of triangles are laid down and measured. By this means all the cases of triangles may be exactly described and resolved. For the practice of which, we may consult Hein's Trigonometry, Gregory's Practical Geometry, or any other authors who have treated of practical geometry or trigonometry ; also, Harris's Lexicon on the plain scale, or Bion on the construction and use of mathematical instruments : See likewise, Prop. 22. lib. 1, of Euclid's elements.

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By the help of the same plain scale, or a line of equal parts, and a protractor (which is a small brass semicircle commonly contained in a case of mathematical instruments, by means of which angles are laid down and measured) any plain right-lined figures are described upon paper, similar to, or just representations of any other plain triangles; which operation is called planning or plotting, and constitutes one part of the art of surveying ground; which is nothing else but the art of describing an exact map, or just representation in miniature of any field or piece of ground, by which its true figure is exhibited, and its area or contents, as well as the length of its several sides, the quantity of its angles, and the position of its parts, are determined. For understanding this, and all the business of surveying, we may consult Bion on mathematical instruments; Harris's Lexicon; Chambers's Dictionary on the word Surveying; Gregory's Practical Geometry improved. These are some of the best books published on this subject.

3dly. When we have advanced thus far, it will be very proper to look into those tables of trigonometry, which go under the name of the trigonometrical canon, or a table of sines, tangents,

gents, and secants, by which all cases of triangles are more exactly solved than by any other means; not indeed by a geometrical description, as in the preceeding articles, but by an arithmetical calculation, founded upon the proportions contained in the two tables of cases of plain triangles, already mentioned at the end of the small treatise of trigonometry annexed to Keil's Euclid.

These tables of fines, tangents, and secants, are two fold, one called a table of natural fines, tangents, and secants, the other a table of logarithmical, or artificial fines, tangents, and secants, which last has always a table of logarithms of absolute numbers joined to it; the first part, viz. the table of natural fines, tangents, and secants, is a table in which the length of the fines, &c. of areas, or angles, of any number of degrees and minutes, are expressed, in respect to the radius of a circle, which is supposed to contain a certain number of equal parts, commonly 10,000,000, by the help of which table any case of triangles may be solved by means of the proportions, answering to the several cases already mentioned; and this is done by the golden rule, or rule of three; since in every
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such case of triangles, the three first terms of four proportional numbers, are given, from which therefore the fourth term may be found, by multiplying the second term by the third, and dividing by the first ; which fourth term, so found, gives the solution of the case, by the help of such a table of natural sines, tangents, and secants.

But although you find those tables of natural sines, tangents, and secants, in Shervin's collection of tables, and in Harris's Lexicon, vol. II. yet they are not commonly found in trigonometrical writers ; because the calculation by the help of artificial, or logarithmical tables, are more easy and expeditious, so that these last, and what we commonly find in books on this subject, such as Hein's Trigonometry, and other books of arithmetic and navigation ; these tables do not exhibit the length of the sines, &c. as the natural tables do, but the logarithm of the numbers expressing those lengths. And therefore since from the nature of logarithms, when four members are in continual proportion, their logarithms are in arithmetical proportion ; hence when we use the logarithmical tables, together with a table of
logarithms,

logarithms of absolute numbers, which always accompanies them, we find the fourth term by adding the second and third terms together, and subtracting the first term from their sum, according to the nature of four arithmetical proportionals. For the construction and use of these tables, we may read Harris's lexicon, vol. I. upon logarithms, Hein's trigonometry; Ozanam's course of mathematics, vol. II. Wilson's trigonometry; Shervin's tables, ch. 1. published by Dr. Halley; also Dr. Wallace's algebra, ch. 12. published in that collection, which is by much the compleatest and most correct collection of trigonometrical tables yet published. Mr. Keil, at the end of his Euclid's elements, has a treatise of logarithms.

Logarithms was the invention of Lord Napier, Baron of Merchiston, a Scotch nobleman, about a century and a half ago. This discovery has been found of great use not only in trigonometry, and those parts of mathematics that require the knowledge of trigonometry, such as astronomy, geography, dialing, navigation, fortification, &c. but likewise in the calculation of the interest of money, in algebra, in the geometry of curved lines, and in

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several parts of natural philosophy, which renders the invention highly useful, and the knowledge of logarithms necessary for all who desire to understand those sciences.

Logarithms may be conceived and defined various ways, but the best definition we can give of them is this :

Logarithms are a set or system of artificial numbers, placed over against the natural numbers from 1 to 10.000 or 100.000, so contrived, that their addition serves for the multiplication of the natural numbers to which they are joined, or belong, i. e. if any two numbers be multiplied together and so produce a third number, the logarithm of the two first added together, will produce the logarithm of the third number.

Any set of artificial numbers that agrees to the preceeding definition, will constitute a system of logarithms. But the common system is that which gives nothing the logarithm of one, and giveth one for the logarithm 10, and two for the logarithm 100, and three for the logarithm of 1000, and so on. This set is formed most commodious for practice : they are called the tabular logarithms, because they are that set
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which we find published in our common tables of logarithms; they are likewise called Briggian's logarithms, to distinguish them from that system which was first contrived by the inventor Lord Napier, called Napier's logarithms, or the hyperbolical logarithms.

From the above definition we have given of logarithms, it follows, that in all systems of logarithms, the logarithm of 1 is 0, because when any number is multiplied by one, it makes no alteration on the number, therefore when the logarithm is added to the logarithm of such a number, it brings no alteration of the logarithm of the number, which would not be the case if the logarithm of 1 was not 0.

From the definition we likewise see that the subtraction of logarithms answers to the division of the natural numbers to which they are placed, i. e. when one number is to be divided by another, if you subtract the logarithm of the divisor from the logarithm of the dividend, the difference is the logarithm of the quotient.

By the use of logarithms we are furnished with an easy and compendious method of multiplying

tiplying and dividing numbers. For when two numbers are to be multiplied together, we need only take the logarithms from a table of logarithms, and add them together, and the sum will be the logarithm whose natural number, when taken out of the same table, will give the product of the two proposed numbers.

When numbers are to be divided, the one by the other, we need only take their logarithms from a table of logarithms, and subtract the logarithm of the divisor from the logarithm of the dividend, the remainder will be a logarithm, whose natural number, being taken out of the same table, will be the quotient of the two proposed numbers.

It follows likewise from the preceeding article, that the logarithm of a fraction will be found by subtracting the logarithm of its denominator from the logarithm of its numerator. For a fraction is nothing else but the quotient of the numerator divided by the denominator. It likewise appears that the logarithm of a proper fraction is negative, because the denominator being greater than the numerator, the logarithm of the denominator is greater than the logarithm of the numerator; and therefore
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when the former it subtracted from the latter, the remainder is a negative quantity, which is the logarithm of the logarithm of the proper fraction.

From what hath been said, the reader may form some notion of the nature and use of logarithms; but fully to understand the nature and constitution of them, would require a considerable knowledge in algebra; and none ought to begin the study of geometry without being first initiated in the principles of arithmetic.

Common arithmetic is necessary for all ranks of people, high and low, rich and poor; but the mathematician and the philosopher might as well pretend to see, after his eyes were taken out, as to enter upon the study of pure or mixed mathematics, without a knowledge of common arithmetic, and even of vulgar and decimal fractions. The first, viz. vulgar fractions, are mostly used amongst the merchants, &c. and decimal fractions are used for mathematical calculations.

The usefulness of arithmetic in common life, has made many authors write upon it, whose

books are common in the schools. The best I know is Hill's arithmetic, Wilson's, and that system given in Martin's magazine.

Decimal fractions are such as have 10, 100, 1000, 10000, 100000, or unity, without any number of cyphers annexed to it for a denominator.

Thus $\frac{5}{10}$, $\frac{25}{100}$, $\frac{125}{1000}$, $\frac{2567}{10000}$, $\frac{100008}{100000}$, are decimal fractions; and the denominators of such fractions being always known to consist of an unit with as many cyphers as there are places in the numerators, need not be expressed or written down as in vulgar fractions, but the numerators only, which are distinguished from integers or whole numbers, by a point or a comma prefixed thus, .8, .25, .125, .2567, .00008, when the decimal point represents unity in the denominator, and the figures on the right of that point, called the number of decimal places, shew the number of cyphers belonging to the denominator.

From this property of the denominator of a decimal fraction, we have a method of notation different from and easier than the general and common way used in vulgar fractions. There also we have the operations in decimals

mals as simple and easy as those in whole numbers, to which decimals, in their nature, are more homogenial than vulgar fractions, since all whole numbers are indeed nothing else but decimal parts of one to another. Thus, if we suppose a series of any equal numbers, as 1111. the figure 1 is of ten times greater value in the first place on the left hand than in the second, and of ten times greater value in the second than in the third, and of ten times greater value in the third than in the fourth; and if we proceed to join the same character (1) to the right of the place of units, we shall make it express in the fifth place, a value ten times less than in the preceeding place of units, and consequently make it express the tenth part of an unit; and in the sixth place, the tenth part of ten, or the hundredth part of an unit. Then proceed thus, as we have integers in the first four places of numbers 1111, we shall have decimal fractions in the last, separated from the integers by the decimal point; thus, 1111.1111. Now, since integers increase from unity towards the left hand in a decuple proportion, so that a figure in any place is ten times as much as the same in the next place below it; therefore, as the first, second, third, &c. place above that of units, is tens, hundreds, thou-

sands; so the first, second, third, &c. place below that of units, is tenths, hundredths, thousandths, &c. decreasing in a sub-decuple proportion.

When we have got a competent knowledge of arithmetic, both vulgar and decimal, we ought to apply ourselves to the study of book-keeping, which is a branch of the mathematics, and highly useful for every person, whether in public or private life. Ask only the merchant and the factor, the good œconomist, the frugal and careful housewife, what the use of book-keeping is, and they'll tell you the great usefulness and advantage of it.

There are many different methods of book-keeping, and every person almost may use a peculiar method of his own, but Clark and some others have wrote very well on this subject, and given proper rules and directions for it.

In the next place, we ought to go to the extraction of the square and cube roots, whereby we can find a mean proportion between two given numbers; and the side of a square equal in area to any given superficies. The area of a circle being given, we can thereby find
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its diameter, or the area of a circle being given, we can find the periphery. We likewise can from a knowledge of the square and cube root, if any two sides of a right angled triangle be given, find the third, as the base and perpendicular being given to find the hypotenuse; or the hypotenuse and perpendicular being given to find the base; or the base and hypotenuse being given to find the perpendicular.

And upon the application of the square and cube root in mensuration, depend many useful trades, as ship-building, gauging, &c.

The next thing we ought to apply to, is, specious arithmetic or algebra.

Algebra, or specious arithmetic, teaches us to solve problems and find out useful theorms.

It is called specious arithmetic, because in all the operations of addition, subtraction, multiplication, division, involution, evolution, the factors are always to be seen in the sum, difference, product, quota, power, root, &c. but it is not so in the arithmetic of numbers.

All

All numbers or quantities, either given or sought, are denoted by the letters of the alphabet, and these by the smaller letters, because they are most easily written. Quantities that are denoted by the same letters, are always supposed equal, or of the same value, consequently, quantities denoted by different letters are supposed to be of different values.

A number prefixed to any letter denoting a quantity, as 1, 2, 3, $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, &c. are called co-efficients, and tell how oft the quantity is taken.

The quantity that has no co-efficient is supposed to have 1 for its co-efficient.

The sign of addition is $+$, which is called plus or more. The sign of subtraction is $-$, which is called minus or less; and the sign always belong to the following quantity.

The sign of equality is $=$, so $a+b=d-f$, signifies that a when b is added to it is equal to d when f is subtracted from it.

Quantities that are joined together by the sign $+$ or $-$ are called compound, as $a+b$ and $a-b$.

All

All other quantities are called simple quantities, as a , aa , ab , &c.

Without the knowledge of the admirable art of algebra, we can neither understand the great and surprising discoveries that have been made by the moderns in this and the last age, in the different parts of mathematics and philosophy, nor yet be qualified to make any considerable discoveries in those sciences. Wherefore we are to be careful to read and understand algebra, by means of which, such vast discoveries have been made, as justly afford matter of wonder and astonishment to those that know them, and shew, more than any thing, the strength of the faculties of the human mind, when duly cultivated with proper exercise and study.

After we have digested the first principles of algebra, we are then qualified to read those treatises, or accounts of the construction and use, of logarithms and logarithmical tables, which are excellent in their kind.

We find at the end of Keil's Euclid, in Malcom's arithmetic, vol. I. and especially in Dr. Sanderfon's elements of algebra, a full account
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of the construction and use of Gunter's scale and the sector. We may consult Harris's lexicon under the words Gunter and Scale, also Bion on the mathematical instruments, which last contains a full account of the construction and use of these, and all other mathematical instruments.

The use and application of trigonometry is very extensive; most part of the things in practical mathematics cannot be fully understood without it; such as altimetry, or the mensuration of altitudes; longimetry, or the mensuration of distances; geodesia, or the surveying of ground; fortification, navigation, dialling, engineering, or gunnery.

Moreover it is necessary for understanding many things in geography and astronomy, such as the magnitudes, distances, and positions of the heavenly bodies.

4thly. In order to understand altimetry, longimetry, and surveying, we may read Leyburn's surveying, Wilson's trigonometry, Sturinus's matheſis, Langley's practical geometry, Gregory's practical geometry, Harris's lexicon,
and

and Chambers's universal dictionary, under those words; likewise Bion on mathematical instruments.

5thly. Navigation, fortification, and architecture, may be studied after reading the first six books of Euclid's elements, and plain trigonometry.

There are many books published on navigation, the best perhaps are Wilfon, Palon, Houseley, &c. but they are all very lame in explaining the foundation of the Mercator's sailing.

On fortification there are a great many treatises published; what are most proper for our reading are Sir Jonas More on Fortification, Ozanam on that subject, published by itself, or in his Course of Mathematics; Muller's Fortification, is the best book on that subject for common use. Vaubon's method is in greatest esteem, and there are several treatises on this subject, published under the title of Vaubon's Fortification, but they are mostly spurious and surreptitious, being disowned by himself. The only genuine treatise of that famous engineer,
printed

printed in the year 1737, under the title *De l'Attaque & de la Defence des Places*, we have a succinct account of this general's method of fortification, and of the principles of the art in the collection of the late Mr. M'Laurin's manuscripts.

The authors of greatest note on civil architecture, are Vitruvius among the antients, Palladio and Scamazi among the moderns. Blondel's *Course of Architecture* is likewise a good book. There is a short introduction to this subject in Wilson's *Trigonometry*, by way of appendix to the second edition. Triart's *Parallel of antient and modern Architecture*, translated from the French, by John Evelyn, is a very proper book for giving a person a full view of the different orders, according to the proportion of the greatest masters. The *Builder's Dictionary* contains not only an explication of the terms, belonging to this art, but likewise large extracts from the writings of the most celebrated authors on this subject. There is a book published under the title of *Paladio Londinensis*, much esteemed.

To attain a knowledge of the art of dialling, or gnomonics, we may consult Leyburn's *Dialling*,

ing, Ozanam's *Dialing*, in his course of mathematics, and a very full treatise on this subject at the end of Bion on the Mathematical Instruments. But the foundation upon which this art is built, is not to be known without some previous knowledge in astronomy, spherical geometry, and spherical trigonometry.

For the art of engineering or gunnery, Gray's *Treatise* may serve in place of all others.

6thly. After we have read the elements of plain geometry and trigonometry, it will then be proper to read the eleventh and twelfth books of Euclid's elements, which belong to solid geometry, containing the properties and proportions of the most useful regular bodies, viz. the prism, cylinder, pyramid, cone, and globe, besides several other things, the knowledge of which will qualify us for making further progress in mathematics.

7thly. When we have done all this it will be proper to read some treatise in practical geometry, that we may get at the art of applying the elements of geometry to the mensuration of all kinds of magnitudes, whether lengths, surface, or bodies. The best book on this subject,

ject, is Gregory's Practical Geometry, Clavius's Practical Geometry is likewise a good book, and what we find on this subject in Ozanam's Course of Mathematics, is worth reading.

8thly. We ought not to neglect geography.

Geography is a science so useful and entertaining, that no gentleman or scholar should be ignorant of it. Without the knowledge of geography, civil history, in which as in a mirror we view the actions and characters of men, cannot be read either with the advantage or satisfaction it is capable of affording to one, who understands chronology and geography: hence it is that geography and chronology are called the two eyes of history; for it is plain, that one can have but an imperfect and indistinct notion of many transactions related in history, when he has no distinct notion of the place or time, which those transactions necessarily require.

To come at a proper knowledge of geography we may first of all read Gordon or Salmon's geographical Grammar, as a compendium or introduction to that science; the first is the best
for

for the problems and axioms in geography, and the other is best for the maps and historical part. When we have gone over these, we may read some larger treatise. The best perhaps we have, as to what relates to the description and history of different countries and places, is Moll's Geography, especially as it is now enlarged, under the title of a Compleat System of Geography, in two volumes, folio.

In reading geography, we ought carefully to observe the maps as we go along, and thereby fix in our memory the situation, extent, and boundaries of the four general parts into which the surface of the earth is divided, viz. Europe, Asia, Africa, and America, which indeed may be best done by the help of the globe; but if we have no globe, by the general map of the whole surface of the earth. When we have got an idea of the situation of the different kingdoms to one another, then we are to consider the several countries, kingdoms, and states, into which the four general parts, especially Europe, is divided; and in reading the description and account of each country, kingdom, and state, we ought to observe in the map the boundaries and positions, the several provinces,
S countries,

countries, and districts they divided into, and likewise the metropolises and most remarkable cities and towns in each country or division, both as to their bearings and distances, and likewise their longitude and latitude. Every other thing remarkable, as seas, mountains, volcanos, lakes, rivers, &c. ought to be observed, especially the remarkable rivers, and that not only on their own account, but likewise because many of them serve as directions for discovering and ascertaining the places where many cities and great towns stand, which are often built upon such rivers, for the benefit of water and commerce.

There is nothing better for giving a person a perfect knowledge of the situation of one county to another than those maps, painted upon wood, where each county is cut out by itself, and the whole when joined together makes a compleat map of the country. A person by often placing and displacing these pieces of wood upon which each county is painted, gets a distinct and lasting knowledge of the geography of a country. It proves also a very good play for children, by which they may be imperceptibly taught geography.

It

It is convenient to have a set of large good maps frequently to inspect and consult upon occasions, as for example, when one is reading the news-papers and history; for which purpose it would be a great improvement of historical books, if they had maps, bound up with them, of such countries as the history treats of, as the bishop of Meaux's Universal History, and other standard historical books.

The most compleat treatise of geography, considered as a branch of mixed mathematics and natural history, is Varenus's Geography, translated into English, improved and illustrated by Sir Isaac Newton and Dr. Jurin, in two volumes, octavo; where you have an account of the atmosphere, the nature and causes of exhalations, wind, rain, meteors, &c. the origin of fountains, mines, vulcanos, &c. But from what hath been already said in a former part of this work, the reader will find reason to dissent from Varenus in most of the above particulars. In this treatise of Geography we have an account of the construction and use of maps and globes, and many other particulars, with the improvements that have been made in this branch of natural knowledge and mixed
mathe-

mathematics, by the discoveries of the moderns, all which make it a most useful and entertaining book.

Finally, as to books which treat of the various parts of mathematics collected together, the best are Duchal's *Cursus Mathesis*, Sturmius's *Mathesis Juvenilis*, Ozanam's *Course of Mathematics*, Wolfius's *Elementa Matheseos Universæ*, which last is the most compleat. Harris's *Lexicon* contains very good excerpts and extracts of most of the branches of mathematics, but is very incorrect, upon account of its typographical errors, especially in algebraical symbols and characters.

As geography and chronology are so necessary to the perfect knowledge of history, every historical book, as I said before, ought to have a correct map prefixed to it. For the study of geography one may read, *Geography Methodised*, for the use of gentlemen and ladies; Hubner's *Introduction to Geography*; *Compleat System of Geography*; Fenning's new *System of Geography*; Bowen's compleat *System of Geography*; and a *Description of the Known World with seventy maps*; Bowen's compleat *Atlas*, or distinct *View of the Known World*, exhibited in sixty-eight

eight maps; Blair's maps of ancient and modern Geography, for the illustration of the tables of chronology and history; Cellarius's maps of ancient geography; *Geographia antiqua & nova*, or a System of ancient and modern Geography, with a set of maps engraved from those of Cellarius, translated from the French of M. l'Abbe Du Fresnoy, with additions from Ptolemy, Arabo, &c. *Geographia Classica*, or the Geography of the ancients, so far described as it is contained in the Greek and Latin classics, in twenty-nine maps of the old world and its several kingdoms and provinces, wherein the chief places mentioned in the classics and other authors are described; Shaw's compleat System of General Geography; Brice's Universal Geographical Dictionary.

I should now have proceeded to say something upon Spherical Trigonometry, Conic Sections, Astronomy, &c. and to have ended with Metaphysics; but what I have further to say, I shall defer till another occasion.

The method in which I design to treat the last subject, is to endeavour to prove that we can know nothing of matter or spirit but by revelation,

lation, and after shewing the necessity of divine revelation, I then attempt to prove that our scriptures are that divine revelation. When I have done so, I am then entitled to use these weapons, and challenge and fight the atheist, deist, and libertine, and prove, in spite of their teeth, the existence of a God, his power and attributes, the immateriality and immortality of the soul of man, the resurrection, and a future judgment. I likewise attempt to shew the great advantage, reasonableness, and necessity of governing our passions, and directing our conduct by the laws of God, and precepts of the gospel. There are many good and learned books which the reader might consult upon this subject, as Dr. Campbel's Answer to Hume's Essay on Miracles, Dr. Gerard's Lateral Proofs for the Holy Scriptures, Lesley against the Jews, and his short method with the Deists, Ellis's Knowledge of Divine things from revelation, not from reason and nature, and his Enquiry whence cometh knowledge to man.

To conclude. Let religion be the main business of our life ; for religion and the knowledge deduced from revelation alone, is that
which

which distinguishes men from brutes: reason does not make the distinction, for brutes, in many instances, act as if they were (and I believe really are) indued with reason, and thereby directed to many of their actions; but we can perceive no appearance of religion in their conduct. Man was their god before the fall, at which time they lost all their sense of duty and regard to him. Religion is the peculiar glory and excellency of man above all the other inhabitants of the earth.

Again, Let us consider this present life as a state of discipline and school, where, by the appointment of God himself, men are placed, that they may be trained up and prepared for an immortal state. Let us often reflect with ourselves that we are now upon our trial, acting a part in the great drama of life, allotted us by the Supreme Lord of the universe, and the time approaches when he will reward or punish every one, as he acts his part well or ill, in that day when he shall judge the world in righteousness by Jesus Christ. Let us be diligent and constant in all duties of piety and devotion towards God, and justice and charity towards our fellow-creatures, and of sobriety,

fobriety, patience, and humility, with respect to ourselves, still remembering that these are the great and fundamental duties, both of natural and revealed religion.

Let us labour to be well acquainted with ourselves, according to the celebrated maxim of the wise men of Greece $\gamma\omega\sigma\theta\iota\ \sigma\epsilon\alpha\upsilon\tau\omega\upsilon$; and to endeavour to make all our studies turn to the making us wiser and better (without which all our knowledge will signify nothing) and let our learning create in us a sense of our entire dependance upon God for every thing, that he may bless all our labours and studies for those valuable purposes.



F I N I S.